ORMISTON SWB ACADEMY

Knowledge Organiser

Autumn Term 2026 – Year 9

Name: _____

Form: _____

Please remember to bring this into school everyday

Regular retrieval throughout a scheme of learning (daily, weekly and monthly) has been proven to reduce the rate of forgetting, supporting you to **retain more in long term memory**- making assessments/ exams way easier! The challenge for you as a student is to **make sure you use your knowledge organiser for each subject properly** to help you to know more and remember more over time. **We've created this walk through to support you** in using your knowledge organiser- for more support speak to your subject teachers

Using your Knowledge Organiser

You will use your knowledge organisers during lessons to engage and support with securing essential knowledge.
We expect you to use your knowledge organisers at home to support with independent study. Below you will find a step-by-step guide of 4 different revision strategies you can use at home. QR codes can be found at the back of this booklet which will link you to videos of these strategies in action.

Strategy 1- Look, cover, write, check – A really simple but effective way to use your knowledge organiser. Focus on a specific area of your knowledge organiser

1	2	3	4	5
Look	**Cover**	**Write**	**Check**	**Repeat**
Start with a **small section of knowledge** that you want to remember e.g *Henry VIII's wives in History.* Read through this section of the knowledge organiser (a couple of times if it helps)	Now **cover up this section** of your knowledge organiser with a post it note or scrap paper.	**Self quiz- what can you remember** and rewrite? Make sure you do this without looking back at your knowledge organiser.	**Remove the post it and check for accuracy**- did you get the key terminology? Was it spelt correctly? Was the order correct? If you drew a diagram, how much of this did you get correct? Most importantly- what did you miss out? Make your corrections in green pen.	After a short break away from your knowledge organiser repeat the look, cover, write, check **until you can recall all of the facts correctly without prompts.** This process can be used for any new knowledge that you want to acquire. It is good idea to do this on a regular basis, once a week.

Strategy 2-Self-Quizzing – You might try this after a few weeks of using your knowledge organiser. Get someone (or yourself) to set you 10 questions using your knowledge orgainser. These could be spellings, key words, equations etc to see how much you can remember! Record your score and see if you can beat your personal best each half term

1	2	3	4	5
Select topic	**Prepare the quiz**	**Answer it**	**Self check**	**Repeat**
Decide **which area you want to be quizzed** on (this might build up over time)	**Create 9 questions on that topic** or, ask somebody else to prepare 10 random questions for you.	**Set a time limit** (depending on the number of questions) and answer the questions without looking at your KO.	Now look at your KO to **self-check**- make a note of your score. Celebrate your successes and make a note of anything you missed or got incorrect.	**Return to this section** in 2/3 weeks- see if you can improve your score! Re-do those questions that you missed or got incorrect.

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Strategy 3- Mind-Maps- Mind maps provide a structured way to capture and organize ideas and information. Use your knowledge organisers (and other resources) to produce your own detailed mind-maps.

1	2	3	4	5
Select a topic	**Identify the key concepts/ideas**	**Add your visuals**	**Unpack the content**	**Test**
Choose a topic from your knowledge organsier/subject	Identify 3-5 key points that you need to remember for this topic and add these branches to your mind-map. You should colour code the different branches so you can visually identify the different concepts.	Add images/icons where appropriate to help you identify and remember key information.	Under each branch (key point), ensure you summarise the key information you need e.g. key dates, facts, beliefs, impact or influence. This will depend on the individual subject.	Once these are complete, you could use the look, cover, write, check method to test your knowledge.

Strategy 4- Flash Cards- Flashcards are small note cards used for testing and improving memory through practiced information retrieval. Flashcards are typically two-sided, with the prompt on one side and the information about the prompt on the other.

1	2	3	4	5
Select a topic	**Identify the key concepts/ideas**	**Add your visuals**	**Unpack the content**	**Test**
Choose a topic from your knowledge organsier/subject which you wish to summarise	On one side of your flash card add the concept or title e.g. Equality or, a question you need to know the answer to e.g. State three ways in which women have been treated unequally to men in the past	Add images/icons where appropriate to help you identify and remember key information.	On the reverse of the flash card add the essential knowledge needed for the concept or write to the answer to the question you have written. This will make it easier to revise from or, for others to ask you questions.	Once these are completed, see how much you can remember for each question/concept by writing it down on a separate piece of paper before you check your answers or, ask somebody to test you. Keep doing this until you can recall all of the information.

Contents Page

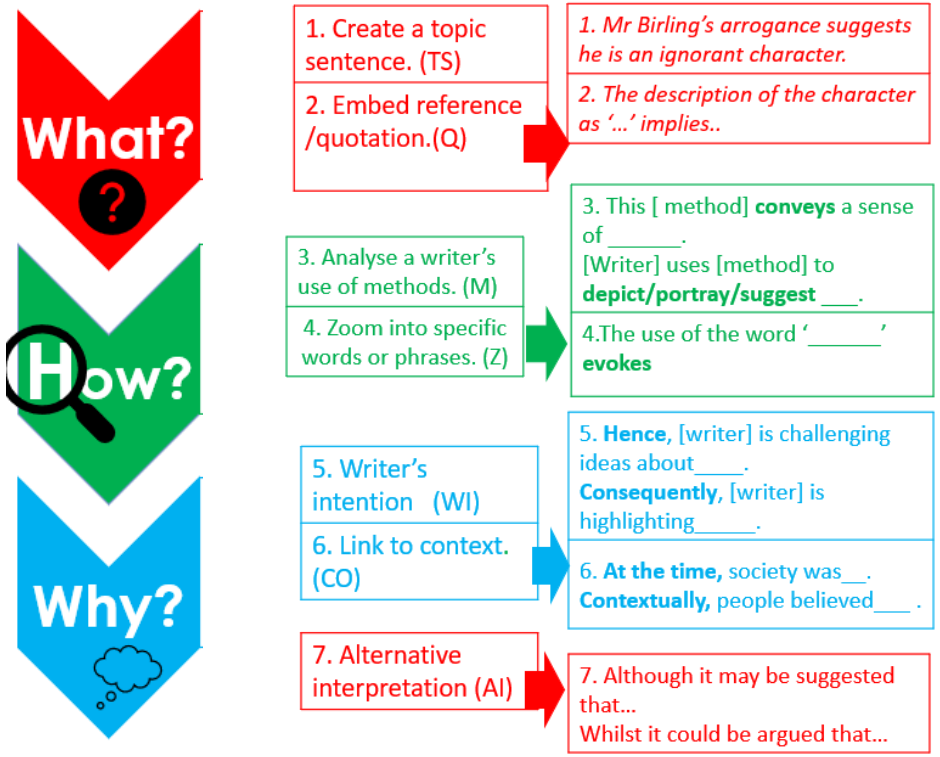
Pages	Subject
5 – 7	English
8 – 27	Maths
28 – 38	Science
39 – 53	Computing
54 – 59	Geography
60 – 63	History
64	PRE
65 – 67	Spanish
68	Art
69 – 71	Music

Year 9 – English – Noughts and Crosses

Thesis Statement

How to write a thesis:	Sentence Stems
One sentence to answer the question with one/two different viewpoint. Begin with a subordinating conjunction: Whereas, Despite, Although, At first glance, Because, Initially. Use a comma to pivot between viewpoints. **Add an 'ultimately' sentence to conclude your thesis.**	Initially [text] is about _____, but it could also be about_____ . Although [the text] appears to be about ___, it is also referring to ____. Despite [character + adjective], they can also be seen as [character + adjective.] **Ultimately**, [Text] explores the idea/theme of _____. **Ultimately**, exemplifies/reinforces /amplifies/ the theme of _____.

Analytical Paragraph



'Slow Write' Sentences

1. Embedded Clause	2. Present Participle	3. Adjective Attack	4. Fronted Adverbial
5. Prepositional Push Off	**6. Semi Colon Split**	**7. So, So**	**8. Simile Start**
9. More, more, more Less, less, less	**10. Colon Clarification**	**11. Repeat and Reload**	**12. Last Word. First Word**

Year 9 – English – Noughts and Crosses

Context

- Malorie Blackman wrote the novel in response to real life events including the racially motivated murder of Stephen Lawrence.
- Blackman criticises inequality and discrimination in society and promotes tolerance and equality.
- The novel is a dystopia – an imagined society where there is great suffering often critiquing existing aspects in society. Blackman uses this method to convey her own political and social views.
- The novel is set in an alternate Britain where the ruling class, the Crosses, are of African descent and have historically oppressed the Noughts – mirroring actual historical social injustices.

Methods

- The novel is written with a dual narrative (a story told from two perspectives) allowing the reader an insight into both characters' thoughts and feelings..
- The novel begins with a prologue to provide an introduction to the novel and build tension
- Blackman employs a range of methods to convey her ideas, including:

Metaphor (A way of describing something by saying it is something else. It is not literal.)

Simile (A way of describing something by comparing it to something)

Personification Giving human characteristics to inanimate/non-human things

Rhetorical Questions (a question (that doesn't require an answer) asked to make the reader think a certain way.)

Why?

5. Writer's intention (WI)

6. Link to context. (CO)

Key terms	Definition
Discrimination	Treating people differently based on a group they belong to rather than as an individual.
Inequality	A stark contrast in circumstances
Dystopia	an imagined society where there is great suffering often critiquing existing aspects in society
Intention	what the writer aimed to achieve
Dual narrative	A story that is told from two different perspectives.
Prologue	an introduction to a book, film, or play.
Naive	having or showing a lack of experience, judgment, or information.
Infantile	to be immature or childish.
Resentment	feeling bitter about being treated unfairly.
Flashback	a structural device that interrupt the narrative to give information and a previous event or character
Hostile	showing of feeling dislike; unfriendly
Deplorable	deserves to be hated; completely unacceptable
Imagery	the use of descriptive or figurative language in literary work

Year 9 – English – Knowledge Organiser - Grammar

Grammar Focus	Key Knowledge	Example	My Example
Sentence	A complete sentence must contain a subject and a verb. Sentence length does not matter.	**She ran.**	
Fragment	A fragment is an incomplete sentence. It is missing a subject or a verb.	~~Running quickly.~~ **He was running quickly.**	
Subject	The subject is the person, place, thing, or idea doing the action. It can be one word or a phrase.	The **brave soldier** fought.	
Pronouns	A pronoun is a word that replaces a specific noun (person, place, or thing) to avoid repetition and make sentences clearer.	I, you, he, she, we, they, my, yours, his, hers, ours, theirs	
Verbs	A verb tells us what the subject is doing or being.	The brave soldier **fought**.	
Nouns	Common nouns name general things. Proper nouns name specific things and use capital letters.	The **assessment** will be on **Tuesday**.	
Adjectives	Adjectives describe nouns and add detail.	The **brave** soldier fought.	
Adverbs	Adjectives describe how, when, where, or how often something happens. They often describe verbs.	He ran **quickly**.	
Prepositions	Prepositions show position, movement, or time. They usually come before a noun.	**Under** the table. **After** the battle.	
Conjunctions	Conjunctions join words, phrases, or clauses together.	And, but, because, so	

Year 9 – Maths – Unit A5 – Formulae

My mathematical journey

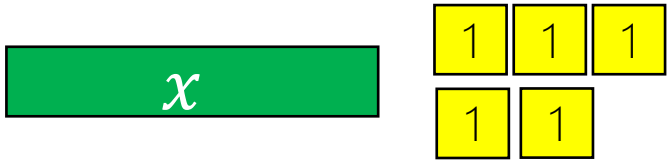
What do I need to remember from before?	What will I learn about in this unit?	Where does this lead?
Arithmetic strategies (NP1, 2, 3, 4)	Substituting numbers into expressions and formulae	All further algebra units
Order of operations (NP5)	Writing and using formulae	Using formulae in geometry (GM3 onwards)
Negative numbers (NP6)	Rearranging formulae to change the subject	Advanced proportion (NP13)
Algebraic expressions (A1, 2, 3)		Advanced probability and statistics (A Level)
Solving equations (A4)		

Substitution

constant → $4x$ ← variable

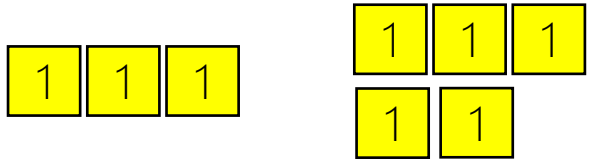
Here is an expression.

$$x + 5$$



We can substitute 3 for x $(x = 3)$

$$3 + 5$$

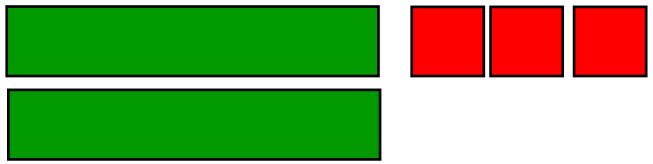


The expression will have a different value based on the number we substitute in!

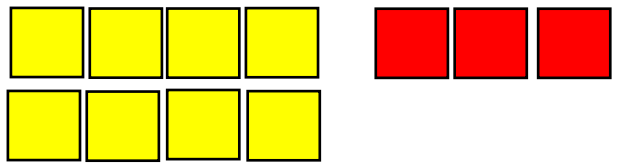
We can now evaluate the expression: 3 + 5 = 8

Here is another expression.

$$2x - 3$$

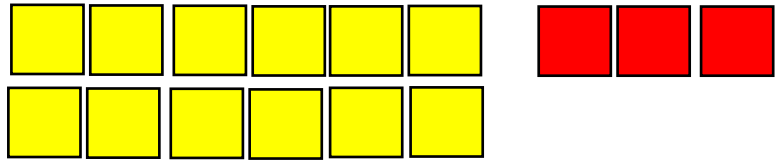


When $x = 4$



8 – 3 = 5 the expression has a value of 5.

When $x = 6$



12– 3 = 9 the expression has a value of 9.

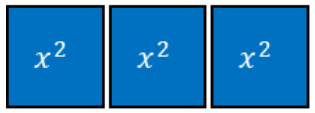
Keyword/Skill	Definition/Tips
Variable	A letter that represents any number (a letter whose value can vary). 3.g. e, y
Constant	A fixed number
Expression	A collection of any variables,, constants and operations
Substitute	Replace a variable with a constant.
Evaluate	Work out the value of a calculation
Formula/Formulae	A set of instructions to work something out. A formula can be written in words, as an expression or as an equation.
Subject	The subject of a formula is the variable that is 'on its own' on one side of the equation. e.g. in the formula $A = lw$, A id the subject.
Rearrange	Rearranging a formula means changing its subject.

Year 9 – Maths – Unit A5 – Formulae

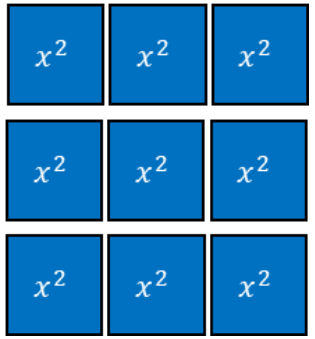
Quadratic Substitution

Look at the difference between the expressions $3x^2$ and $(3x)^2$.

$3x^2$



$(3x)^2$



If $x = 2$

$3x^2 = 3(2)^2 = 12$

$(3x)^2 = \big(3(2)\big)^2 = (6)^2$

Make sure you read the question carefully and apply the order of operations.

Example:

When $a = 2$ and $b = 5$, evaluate:

$(a + b)^2$ and $a + b^2$

$(a + b)^2$	$a + b^2$
$= (2 + 5)^2$	$= 2 + (5)^2$
$= (7)^2$	$= 2 + 25$
$= 49$	$= 27$

Formula

A formula is a set of instructions for working something out.

Here is a formula written in words.

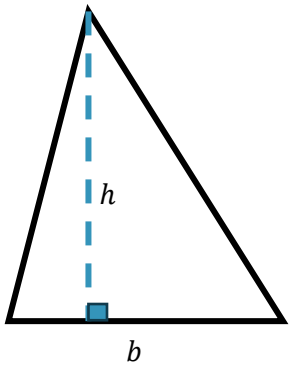
half base × height

Here is the same formula, written using numbers and letters.

$\frac{1}{2}bh$

Here is the same formula, written as an equation.

$A = \frac{1}{2}bh$



We can substitute into this formulae.

If the base was 10cm and the height was 6cm:

$A = \frac{1}{2} \times 10 \times 6 = 30cm^2$

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Year 9 – Maths – Unit A5 – Formulae

Writing Formulas

We can make formulas in lots of different contexts.

Example:

A taxi journey costs £3.50 plus £2 for every mile.

We can represent this as a formula.

$C = 3.5 + 2m$

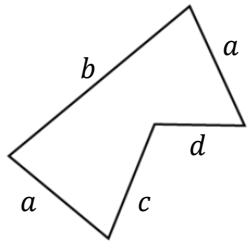
Where C is the cost and m is the number of miles.

You can now find the cost of any journey.
If the journey was 5 miles:

$$C = 3.5 + 2(5) = 13.5 = £13.50$$

Example:

Write a formula for the perimeter of this shape.
Use P for perimeter.



Perimeter is adding up the distance around the outside.

$$P = a + b + a + c + d$$

Simplify if you can:

$$P = 2a + b + c + d$$

Forming and Solving Equations

We can work information out by forming an equation and then solving it.

Here is a rectangle:



Its perimeter is 34cm.

We can find its length by setting up an equation. In these types of questions, you need to:

- Give the unknown a letter.
- Write a formula/form an equation.
- Substitute in what you know.
- Solve to find the unknown.

Here we don't know the length so will call that x.



$$P = 4 + x + 4 + x = 2x + 8$$
$$P = 2x + 8$$

The perimeter is 34cm so we can substitute that in and solve the equation.

$$34 = 2x + 8$$
$$26 = 2x$$
$$13 = x$$

The length of the rectangle is 13cm.

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Year 9 – Maths – Unit A5 – Formulae

Subject of the Formula & Rearranging Formula

The subject of a formula is the quantity the formula calculates.
If we write the formula as an equation, the subject appears on its own on one side of the equals sign.



In this formula, the area is the subject (A is the subject).

Here is a formula whose subject is a.

$$a = b + c$$

Because the formula is written as an equation, we can alter it by doing the same thing to both sides.

$$a = b + c$$

$$(-b) \quad a - b = c \quad (-b)$$

ow c is the subject.

We have changed the subject by rearranging the formula.

Here is a formula where y is the formula.

$$y = 2x + a$$

I want to make x the subject, so I want that on its own.

$$y = 2x + a$$

$$(-a) \qquad (-a)$$

$$y - a = 2x$$

$$(\div 2) \qquad (\div 2)$$

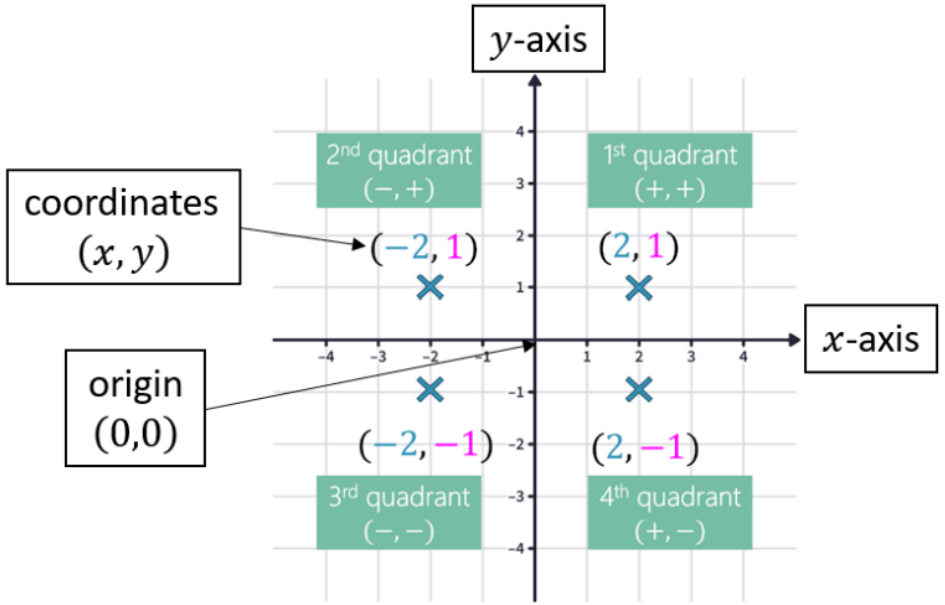
$$\frac{y - a}{2} = x$$

When dividing you can write it in the form of a fraction.

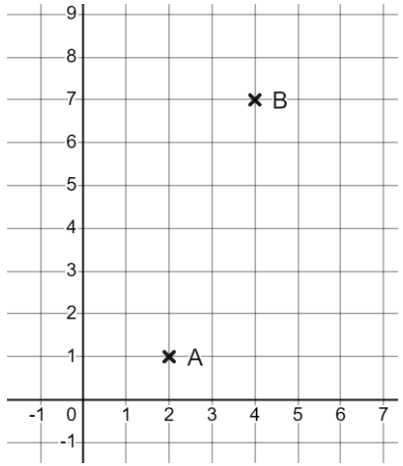
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Year 9 – Maths – Unit A6 – The Cartesian Grid

Cartesian Grid & Coordinates



Midpoints



To find the midpoint of AB we need to find the midpoint of the x coordinates…

$$\frac{2+4}{2} = 3$$

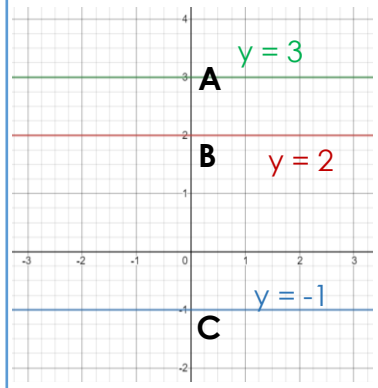
…and the midpoint of the y coordinates:

$$\frac{1+7}{2} = 4$$

Midpoint of $AB = (3, 4)$

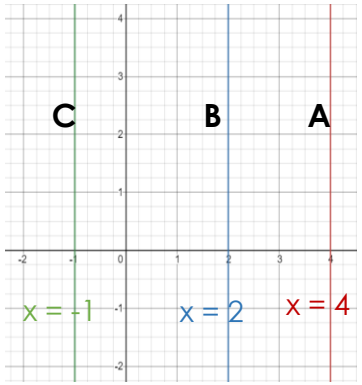
What do I need to remember from before?	What will I learn about in this unit?	Where does this lead?
Number lines (NP1, 2, 3, and 6)	Plotting and using coordinates	Sequences (A7)
Substitution (A1 and A5)	The links between graphical and algebraic representations of equations	Inequalities on graphs (A8, A10)
Writing expressions, equations and formulae (A2, A3, A4 and A5)	Gradient as a measure of steepness	Advanced equations of lines (A10)
		Quadratic graphs (A12)
		Advanced graphs (A14, A15)

Horizontal & Vertical Lines



Here are some coordinates for line A
(-2,3) (-1,3) (0,3) (1,3)
Every y-coordinate equals 3!
Therefore, the equation of line A is

$$y = 3$$



Here are some coordinates for line A
(4,-1) (4,0) (4,1) (4,2)
Every x-coordinate equals 4!
Therefore, the equation of line A is

$$x = 4$$

Keyword/Skill	Definition/Tips
Coordinate	Written in **pairs** as (x, y). The **first** term is the **x-coordinate** (movement **left or right**). The **second** term is the **y-coordinate** (movement **up or down**)
Axis/Axes	The lines that make up a graph. The y axis is the vertical line. The x axis is the horizontal line.
X-coordinate	This is the first term written in a coordinate, it represents where the coordinate is on the x axis (x, y)
Y-coordinate	This is the second term written in a coordinate, it represents where the coordinate is on the y axis (x, y)
Linear Graph	A group of coordinates that form a straight line
Origin	The very middle of a graph, the coordinate of (0,0)
Region	The area of a graph that satisfies an inequality
Gradient	How steep a line is
Y-Intercept	The point where a line or a curve crosses the y-axis of a graph
Plane	A flat, two-dimensional surface

Year 9 – Maths – Unit A6 – The Cartesian Grid

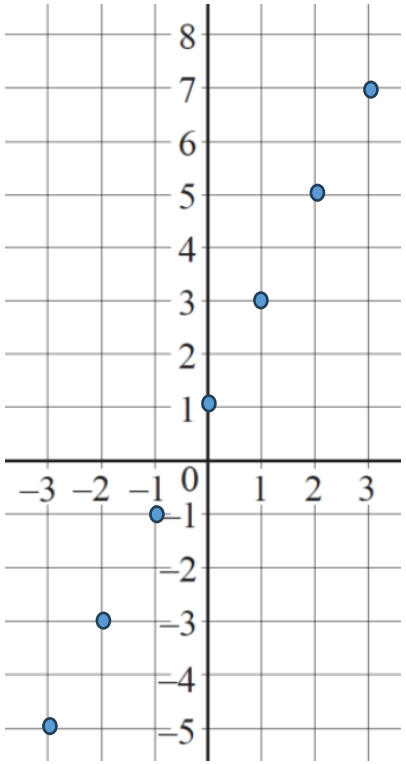
Plotting Linear Graphs (Oblique Lines)

To plot $y = 2x + 1$ we need to substitute in some x-coordinates to get the y-coordinates.
For example, to get this coordinate we substitute $x = 3$ into $y = 2x + 1$

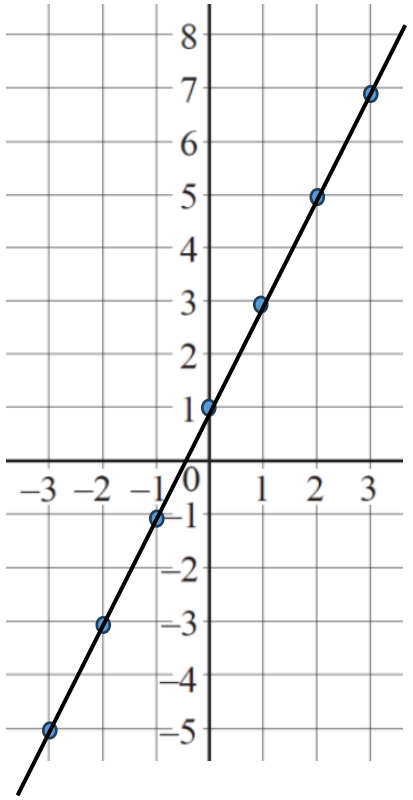
$$y = 2(3) + 1$$
$$y = 7$$

x	-3	-2	-1	0	1	2	3
$y = 3x - 1$	-5	-3	-1	1	3	5	7

Once you have enough coordinates you can plot and draw the graph.



Once the coordinates are plotted. Make sure you use a pencil and ruler to connect the points. Be careful and make sure you go through all your points and extend the line through the whole graph.



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Origin	The very middle of a graph, the coordinate of (0,0)
Region	The area of a graph that satisfies an inequality
Gradient	How steep a line is
Y-Intercept	The point where a line or a curve crosses the y-axis of a graph
Plane	A flat, two-dimensional surface
Horizontal	Going from side to side
Vertical	Going in an up-down direction

Year 9 – Maths – Unit A6 – The Cartesian Grid

Plotting Quadratic Graphs

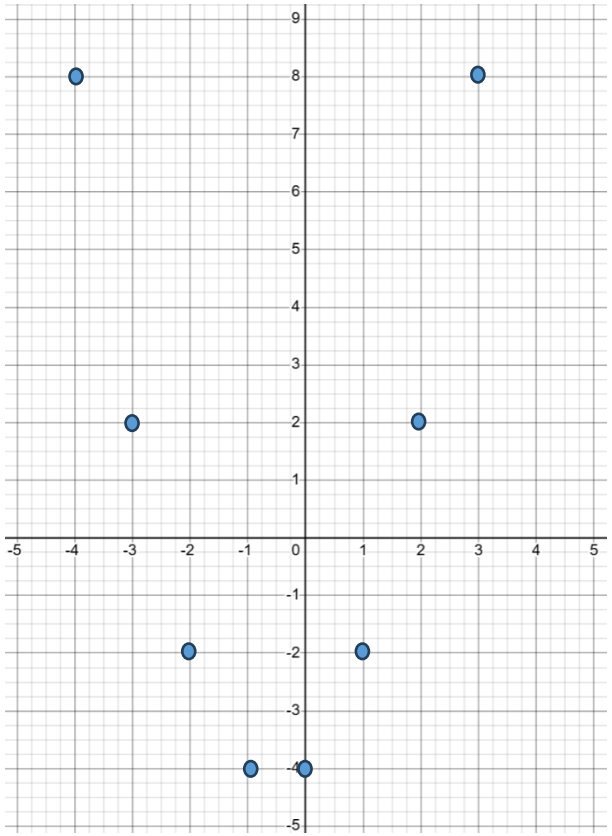
We can use a table of values to help us plot the graph of $y = x^2 + x - 4$.

We substitute x-values into the equation to get the y-coordinates.

Example: $y = x^2 + x - 4$ when $x = 3$ $y = (3)^2 + (3) - 4$ $y = 8$

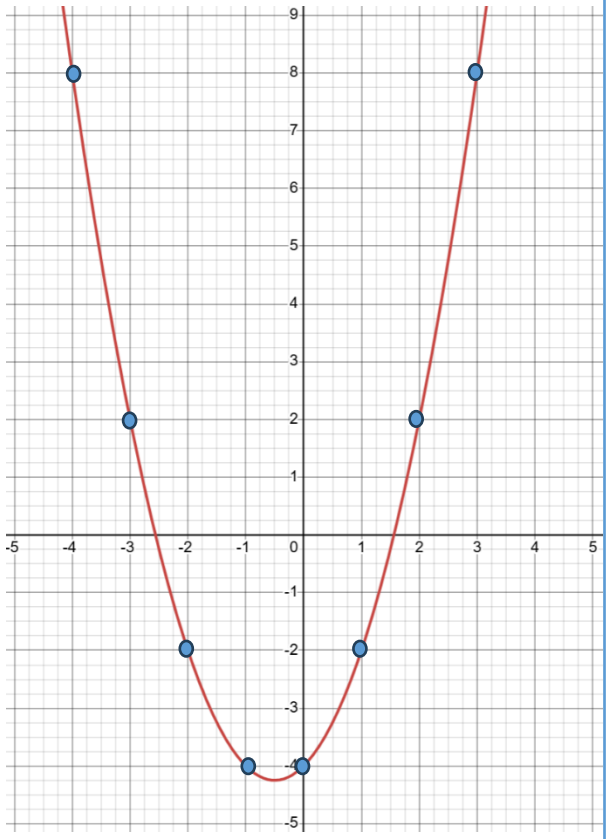
x	-4	-3	-2	-1	0	1	2	3
$y = x^2 + x - 4$	8	2	-2	-4	-4	-2	2	8

Once you have completed the table, plot the coordinates.



Once the coordinates are plotted. Make sure you use a pencil to connect the points. With a quadratic graph you need to draw a smooth curve. (Not straight lines!)

Be careful and make sure you go through all your points and extend the line through the whole graph.



Keyword/Skill	Definition/Tips
Coordinate	Written in **pairs** as (x, y). The **first** term is the **x-coordinate** (movement **left or right**). The **second** term is the **y-coordinate** (movement **up or down**)
Axis/Axes	The lines that make up a graph. The y axis is the vertical line. The x axis is the horizontal line.
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Linear Graph	A group of coordinates that form a straight line
Origin	The very middle of a graph, the coordinate of (0,0)
Region	The area of a graph that satisfies an inequality
Gradient	How steep a line is
Y-Intercept	The point where a line or a curve crosses the y-axis of a graph
Plane	A flat, two-dimensional surface
Horizontal	Going from side to side
Vertical	Going in an up-down direction

Year 9 – Maths – Unit A6 – The Cartesian Grid

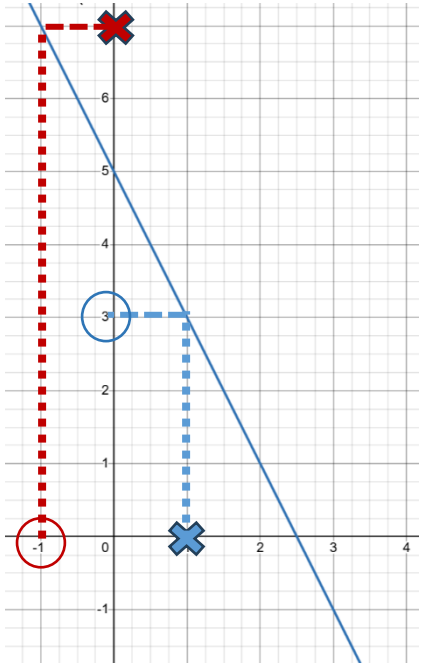
Reading Values from Graphs

You will need to read values from graphs that have been drawn. You can do this from a linear graph, a quadratic graph or even graphs that are neither.

Linear Graph

Here is a linear graph.

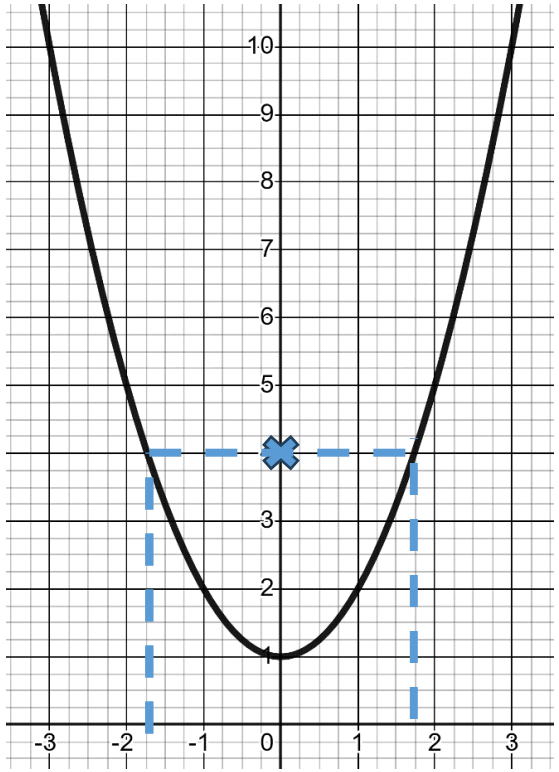
Find the value of y when $x = 1$.
You need to go to $x = 1$ on the graph and go up (or down) to where the line is. Then read off the y value, $y = 3$.



Find the value of x when $y = 7$
You need to go to $y = 7$ on the graph and go left (or right) to find where the line is. Then read off the x value, $x = -1$

Quadratic Graphs

Here is a quadratic graph. When you are given a y-value, there will be two corresponding x-value,



Example:

Find the values of x, when $y = 4$.

You go to the line $y = 4$ and you need to see where it crosses the graph that is given. Here it crosses in two places. Read off both x-values for your answer. If it is not on a solid point, make sure you read the scale carefully. There will be a range for the answer, but you need to be as accurate as possible.

Here $x \approx -1.6$ and $x \approx 1.6$

Keyword/Skill	Definition/Tips
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Year 9 – Maths – Unit A6 – The Cartesian Grid

Gradient



This line slopes upwards as we go from left to right.
The gradient is positive.



This line slopes downwards as we go from left to right.
The gradient is negative.

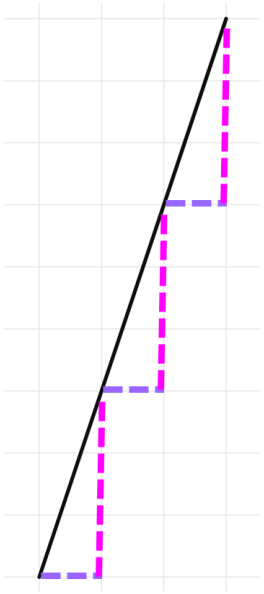
This line has a gradient of zero.

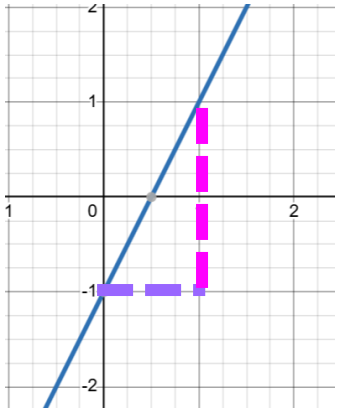
The gradient of this line is undefined.

We write the value of a gradient as a number.

We calculate the number by looking at how many units up/down the line goes for every 1 unit right.

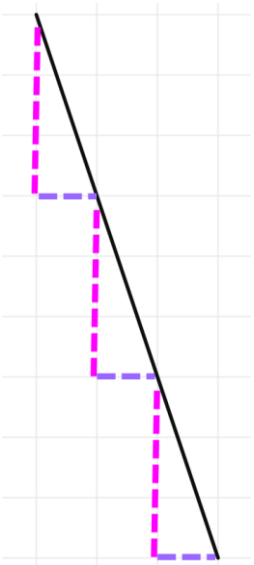
This line has a gradient of 3. For every 1 unit right, it goes 3 units up.





It works the same on cartesian grids. Here you go 1 unit across and 2 up so the gradient of this line is 2. Be careful with the scale, it is always 1 unit across based on whatever the scale is, here 4 little boxes are worth 1 so we go that far across.

This line has a gradient of 3. For every 1 unit right, it goes 3 units up.



Keyword/Skill	Definition/Tips
Coordinate	Written in **pairs** as (x, y). The **first** term is the **x-coordinate** (movement **left or right**). The **second** term is the **y-coordinate** (movement **up or down**)
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Year 9 – Maths – Unit A6 – The Cartesian Grid

Finding the Equation of the Graph/Line

The coefficient of x gives the gradient

$$y = mx + c$$

The constant gives the y-intercept

We can find the equation of the graph by looking for the gradient and the y-intercept of the line.

When x increases by 1, y increases by 2. That means the gradient of the line is 2.
Looking where the graph crosses the y-axis (when the x-coordinate equals 0) then we can see the y-intercept is 1.

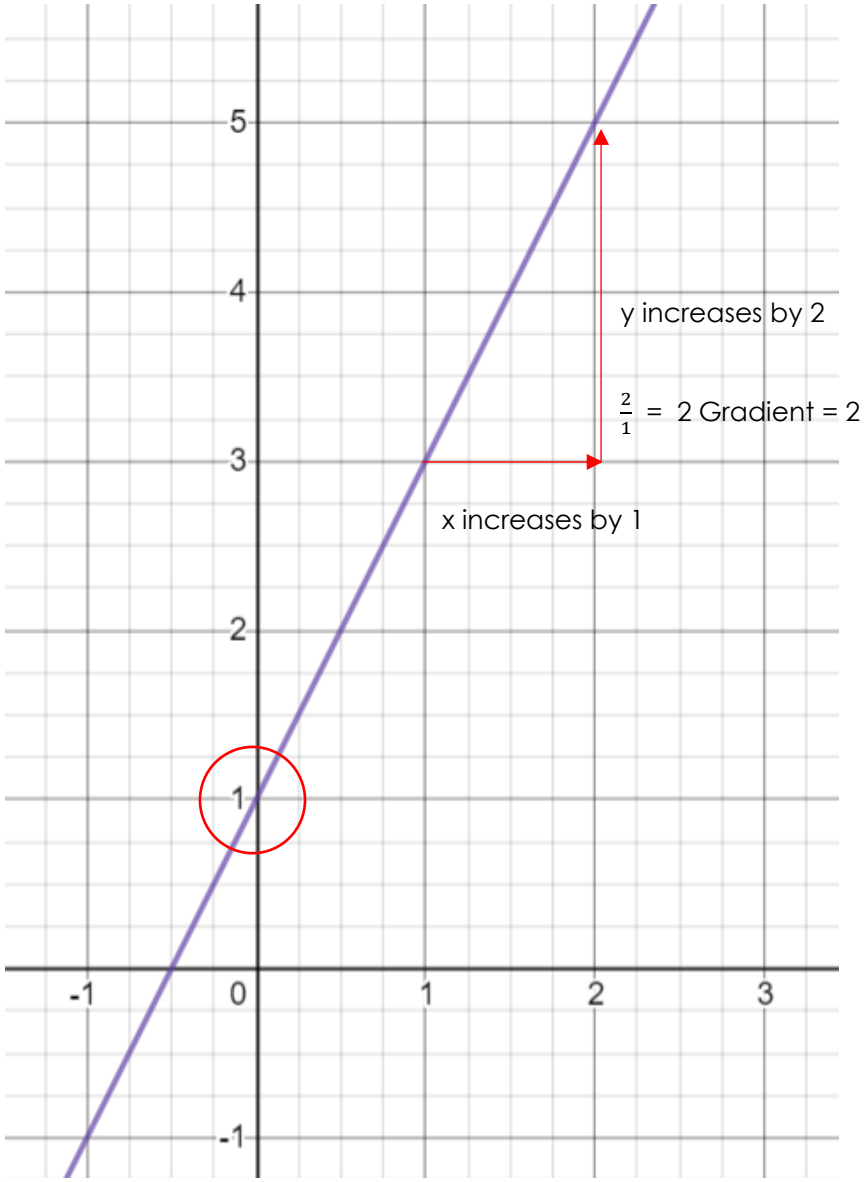
We can represent this as:

$$y = 2x + 1$$

Gradient = 2

y –intercept = 1 (0,1)

What this equation means, is you take the x-coordinate and multiply it by 2 (the gradient) then add 1 to get the y-coordinate.
E.g. x = 1 (2 x 1) + 1 = 3 y = 3 (1,3)



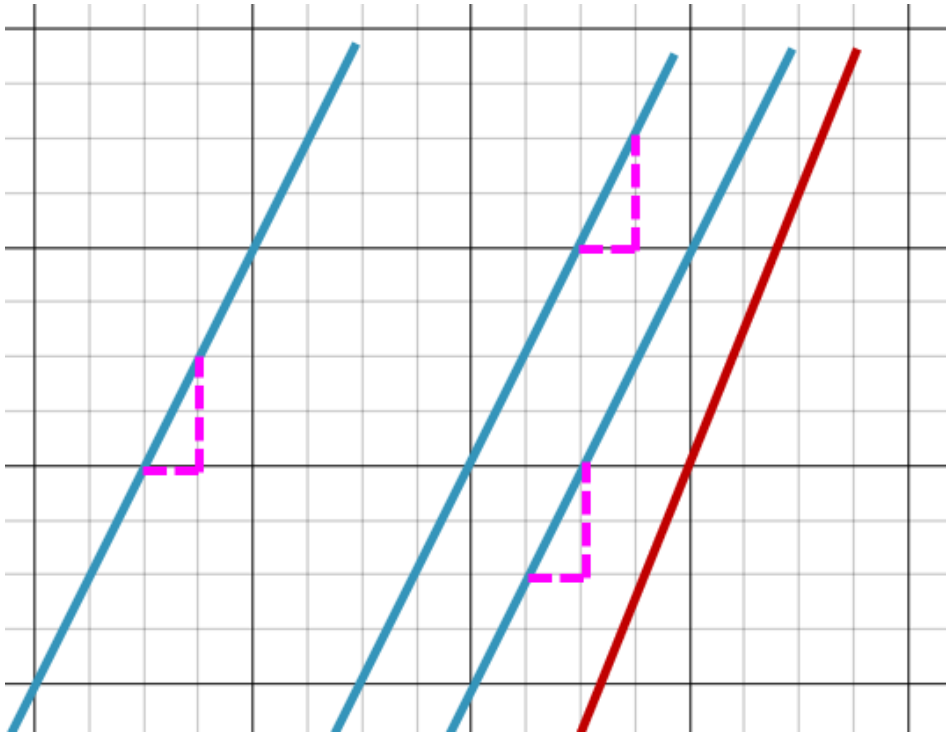
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Year 9 – Maths – Unit A6 – The Cartesian Grid

Parallel Lines

The three blue lines are parallel to each other.

They all have a gradient of 2.



This line has a gradient slightly greater than 2.

It is not parallel to the others.

Parallel lines have the same gradient.

This can help find the equations of parallel lines.

Example:

Find the equation of a line that is parallel to $y = 3x - 10$ and passes through the point $(1, 5)$.

As the lines are parallel the gradient will be the same.

$$y = 3x + c$$

Substitute the point you have been given into this equation to find the y-intercept.

$$5 = 3(1) + c$$

$$5 = 3 + c$$

$$c = 2$$

Therefore, the equation of the line we need is:

$$y = 3x + 2$$

Keyword/Skill	Definition/Tips
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Year 9 – Maths – Unit A7 – Sequences

Finding Missing Terms

A sequence follows a pattern. Once you recognise that pattern you can find missing terms, or the next terms in the sequence.

Example:
1, 5, 9, 13, 17, … , …

If we want to find the next two terms, we can see the pattern/rule here is adding 4. So, the next two terms will be 21 and 25.

When there is more than one gap between terms in a linear sequence you can think about how much two 'jumps' are worth to find the common difference.
Example
4, … , 16, … , 28,

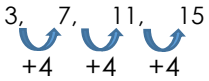


Two jumps is worth 12. One jump must be 6. The difference between each term is 6. The missing terms will then be 10 and 22.

Term to Term Rule

2, 6, 10, 14… This sequence follows the rule "add 4"
81, 27, 9, 3… This sequence follows the rule "divide by 3"
5, 8, 14, 23… This sequence follows the rule "add 3, add 6, add 9…"

You may be given the starting number then the rule.
Example Start at 3 add 4 each time



Position to Term Rule (Using the nth Term)

The nth term can be used to find any term in a sequence. To use the nth term you substitute in the value of the position you need.

Example
If the nth term is $3n - 5$ and you need to find the 10th term:

Substitute $n = 10$ into the nth term

$(3 \times 10) - 5 = 25$

10th Term = 25

Finding the nth term

To find the nth term of a sequence, you first start by finding the difference of each term.

7, 12, 17, 22, 27, 32, 37, …
+5 +5 +5 +5 +5 +5

The difference between each term is 5. That means the sequence has something to do with the 5 times table, we can call this $\mathbf{5n}$
Then see what you need to do from the 5 times table to get to the number in the sequence

(position)	1	2	3	4	5	n
	x5	x5	x5	x5	x5	
Times table	5	10	15	20	25	$5n$
	+2	+2	+2	+2	+2	
Sequence	7	12	17	22	27	$5n + 2$

Therefore, the nth term of the sequence = $\mathbf{5n + 2}$

My mathematical journey

What do I need to remember from before?
- Arithmetic (NP2, NP3, NP4)
- Solving linear equations (A4)
- Formulae, including substitution (A5)
- Linear graphs (A6)

What will I learn about in this unit?
- Linear sequences
- nth term formulae for linear sequences
- Recognising non-linear sequences

Where does this lead?
- Advanced linear graphs (A10)
- Advanced sequences – quadratic and geometric (A13)
- Recurrence relations (A13)
- Exponential functions (A15)
- Sequences on A-Level maths

Keyword/Skill	Definition/Tips
term	A number in a sequence. Terms have position 1, 2, 3, 4, and so on, and these positions are labelled with the variable n. e.g. in the sequence 5, 7, 9, 11, … the 1st term (where $n = 1$) is 5 and the 4th term (where $n = 4$) is 11.
term-to-term rule	We can define a sequence with a term-to-term rule, which tells us where to start and how to get from one term to the next. e.g. in the sequence 5, 7, 9, 11, … the term-to-term rule would be 'start at 5 and add 2 every time'
increasing sequence	A sequence where each term is greater than the one before. e.g. 5, 7, 9, 11, …
decreasing sequence	A sequence where each term is less than the one before. e.g. 11, 9, 7, 5, …
nth term formula	A formula that calculates the value of each term, using its position, n. For this reason, it is sometimes called the position-to-term formula. e.g. For the sequence 5, 7, 9, 11, … the n^{th} term formula is $2n + 3$
coefficient	A number/letter that multiplies another in an expression. e.g. In the expression $2n + 3$, the coefficient of n is 2 and the coefficient of 2 is n.
linear sequence	A sequence where the difference between terms is constant (doesn't change). e.g. 5, 7, 9, 11, … (the difference is 2) or 10, 7, 4, 1, … (the difference is –3).
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geometric sequence	A sequence where there is a constant multiplier between terms. e.g. 1, 2, 4, 8, 16, … (each term is multiplied by 2 to get the next)
Fibonacci-style sequence	A sequence where each term is the sum of the previous two. e.g. 1, 4, 5, 9, 14, 23, …

Year 9 – Maths – Unit A7 – Sequences

Using the Nth Term

You can determine if a number is a term in a sequence by making it equal to the nth term and then solving the equation.
If the answer is an integer, then it is part of the sequence. If the answer is a decimal/fraction it is not part of the sequence.

Is 811 part of the sequence $8n - 5$?

$8n - 5 = 811$

$+5 \quad +5$

$8n = 816$

$\div 8 \quad \div 8$

$n = 102$ **Yes!**

Is 689 part of the sequence $5n + 6$?

$5n + 6 = 689$

$-6 \quad -6$

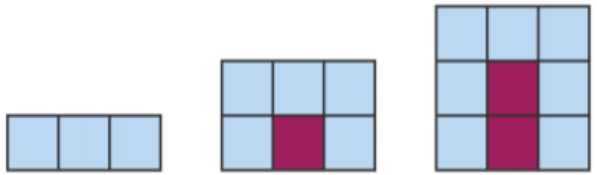
$5n = 683$

$\div 5 \quad \div 5$

$n = 136.6$ **No!**

Recognising Patterns from Diagrams

A number pattern in a diagram often requires counting shapes to find the rule. Look at how the pattern grows from one term to the next.



Pattern 1

0 purple
3 blue
3 in total

Pattern 2

1 purple
5 blue
6 in total

Pattern 3

2 purple
7 blue
9 in total

You can now predict that in pattern 4 there will be:
3 purple, 9 blue and 12 in total.

Special Sequences

There are some sequences you will need to recognise that aren't linear sequences.

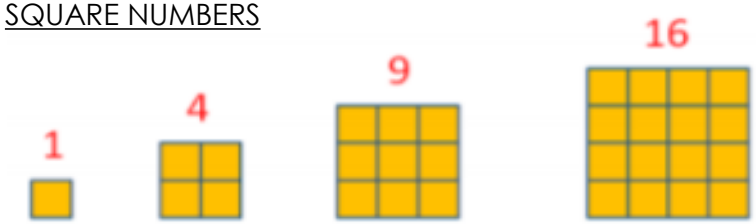
Square numbers – 1, 4, 9, 16, 25, 36, …

Cube Numbers – 1, 8, 27, 64, 125, 216, …

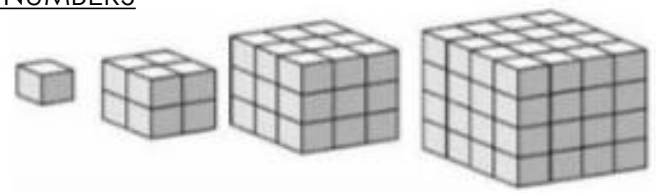
Triangle Numbers – 1, 3, 6, 10, 15, 21, 28, …

A Fibonacci Sequence – 1, 1, 2, 3, 5, 8, 13, 21, …

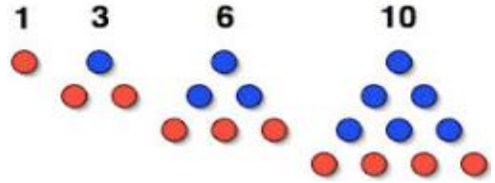
SQUARE NUMBERS



CUBE NUMBERS



TRIANGULAR NUMBERS



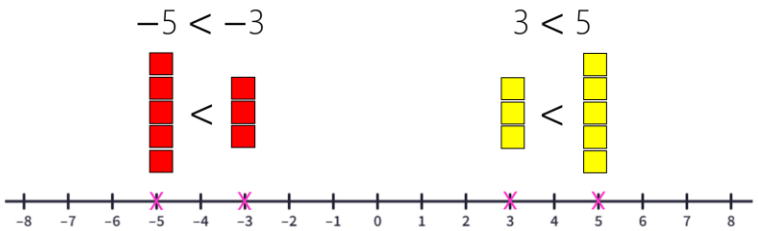
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Year 9 – Maths – Unit A8 – Linear Inequalities

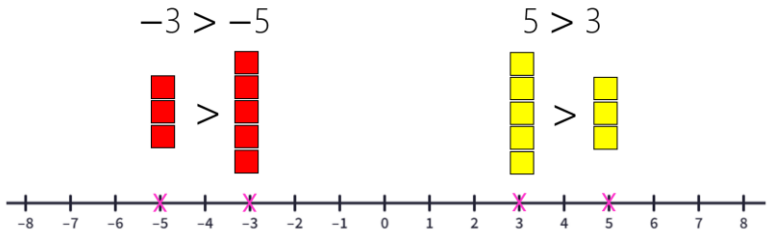
Inequality Symbols

$<$ - Less than $>$ Greater than
$\leq$ - Less than or equal to $\geq$ Greater than or equal to

$x < 2$ means x is less than 2
$x \leq 2$ means x is less than or equal to 2
$x > 2$ means x is more than 2
$x \geq 2$ means x is more than or equal to 2



Less than means to the left on the number line.
Sometimes this is smaller in magnitude, sometimes it is not.



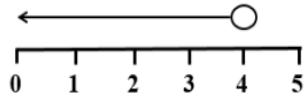
Greater than means to the right on the number line.
Sometimes this is bigger in magnitude, sometimes it is not.

Representing inequalities on a number line

Symbol	Circle	Direction of Arrow
<	Open ○	Left
>	Open ○	Right
≤	Closed ●	Left
≥	Closed ●	Right

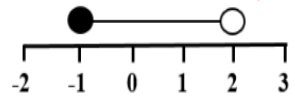
We use open and/or closed circles to represent inequalities on a number line. A closed circle means that the number **is** included in the represented group of values. An open circle means that the number **is not** included in the represented group of values.

The inequality $x < 4$, would be represented like this.



We call this a comparative inequality. That is because there are an infinite amount of numbers less than 4 that we are comparing to our inequality.

$-1 \leq x < 2$ would look like this.



This is a restrictive inequality as we have a lower and upper limit for the inequality. It is either equal to or greater than -1 and it is less than 2.

Keyword/Skill	Definition/Tips
Integer	Whole number including 0 and negative numbers. No fractions or decimals.
Inequality	Compares two values showing if one is less than, greater than or not equal.
Greater than	One number is BIGGER than another number.
Less than	One number is SMALLER than another number.
Equal to	Two things have the SAME value.
Equation	Says that two things are equal. (1 + 1 = 2).
Satisfy	A value that solves an equation. E.g. 2x + 1 = 9 x =4 so x=4 satisfies the equation.
Variable	A symbol for a number we don't know yet, usually a letter.
Coefficient	A number used to multiply a variable. E.g. 6y = 6 x y . y is the variable and 6 is the coefficient.
Inverse	Opposite of (i.e. x and ÷, + and -)
Comparative Inequality	An inequality with one limit. Comparing a number to other values.
Restrictive Inequality	An inequality with an upper and lower limit.

Year 9 – Maths– Unit A8 – Linear Inequalities

Solving Inequalities

We can solve inequalities the same way that we solve equations.

Example 1:

$2x + 1 \leq 9$
$(-1) \quad (-1)$

$2x \leq 8$
$(\div 2) \quad (\div 2)$

$x \leq 4$

You may get asked to represent your solution on a number line



Unlike equations, with inequalities we get a set of many solutions.

Example 2:

$4x + 3 > 12 + x$
$(-x) \quad (-x)$

$3x + 3 > 12$
$(-3) \quad (-3)$

$3x > 9$
$(\div 3) \quad (\div 3)$
$x > 3$

We can solve restrictive inequalities the same way but treat them as two separate inequalities.

Example:

$-3 \leq 2x + 3 < 10$

$-3 \leq 2x + 3$ and $2x + 3 < 10$

$(-3) \quad (-3)$ and $(-3) \quad (-3)$

$-6 \leq 2x$ and $2x < 7$

$(\div 2) \quad (\div 2)$ and $(\div 2) \quad (\div 2)$

$-3 \leq x$ and $x < 3.5$

$-3 \leq x < 3.5$

When we multiply or divide both sides of an inequality by a negative number, we must rotate the inequality sign to keep a true statement.

$x > 2$ Some values of x: $3, 4, 5, \ldots$
$(\times -1) \qquad (\times -1)$

$-x < -2$ Some values of $-x$: $-3, -4, -5$



Example:

$4 - 3x > 12$
$(-4) \quad (-4)$

$-3x > 9$
$(\div (-3)) \qquad (\div (-3))$

$x < -3$

Whenever we solve an inequality (or an equation) we want to have the positive x not the negative x.

Keyword/Skill	Definition/Tips
Integer	Whole number including 0 and negative numbers. No fractions or decimals.
Inequality	Compares two values showing if one is less than, greater than or not equal.
Greater than	One number is BIGGER than another number.
Less than	One number is SMALLER than another number.
Equal to	Two things have the SAME value.
Equation	Says that two things are equal. (1 + 1 = 2).
Satisfy	A value that solves an equation. E.g. 2x + 1 = 9 x =4 so x=4 satisfies the equation.
Variable	A symbol for a number we don't know yet, usually a letter.
Coefficient	A number used to multiply a variable. E.g. 6y = 6 x y . y is the variable and 6 is the coefficient.
Inverse	Opposite of (i.e. x and ÷, + and -)
Comparative Inequality	An inequality with one limit. Comparing a number to other values.
Restrictive Inequality	An inequality with an upper and lower limit.

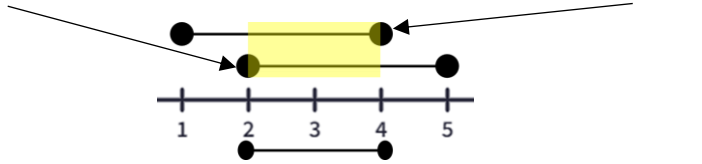
Year 9 – Maths– Unit A8 – Linear Inequalities

Solving Systems of Linear Inequalities

Sarah will be at the park from 2 p.m. until 5 p.m.

Joanna will be at the park between 1 p.m. and 4 p.m.

$2 \leq x \leq 5$ $\quad$ $1 \leq x \leq 4$



They will be at the park together from 2 p.m. until 4 p.m.

$2 \leq x \leq 4$

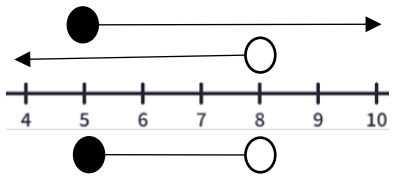
This is solving systems of linear inequalities. It is when we find values that satisfy two (or more) inequalities.
You may need to solve inequalities before you do this.

Example:
Find the set of numbers that satisfy both inequalities and draw a number line to represent it:

$2x \geq 10$
$x + 1 < 9$

$2x \geq 10$
$(\div 2) \quad (\div 2)$
$x \geq 5$

$x + 1 < 9$
$(-1) \quad (-1)$
$x < 8$

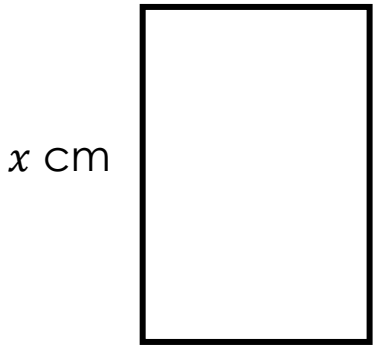


$5 \leq x < 8$

Inequalities in Context

We can form and solve an inequality when we see phrases like, "less than," "greater than," "at least," "at most" and more.

Example:
The width of a rectangle is 4cm and its height is unknown.
The area is at least 24cm^2
What can we say about its height?



$A \geq 24cm^2$

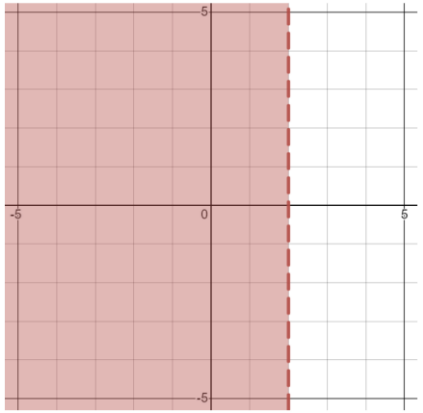
$4x \geq 24cm^2$
$(\div 4) \quad (\div 4)$
$x \geq 6cm$

The height is at least 6cm

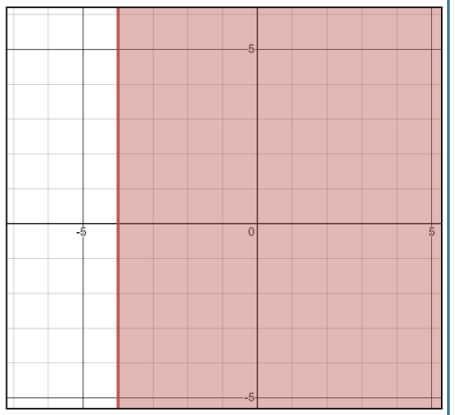
Representing Inequalities on a Graph

We can represent inequalities on a graph by shading the correct region. When the inequality uses ≤ or ≥ then we use a solid line. We use a dotted line when it involves < or >.
Shade the correct region based on the inequality.

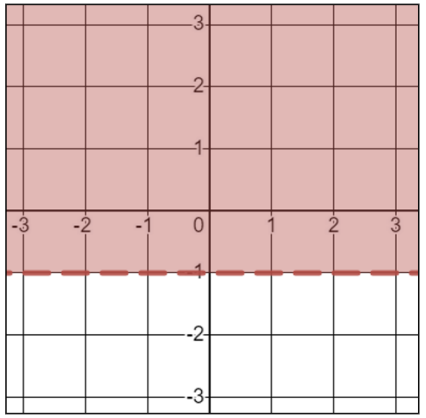
This is the region $x < 2$.



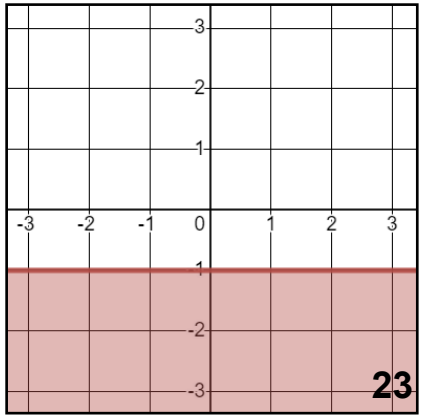
This is the region $x \geq -4$.



This is the region $y > -1$.



This is the region $y \leq -1$.



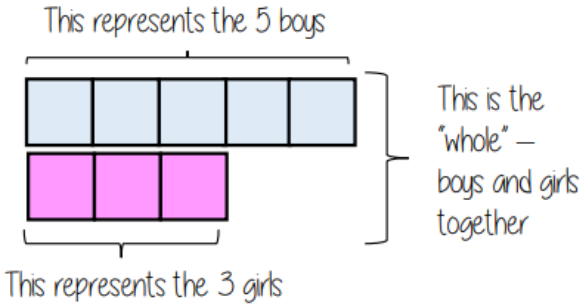
Year 9 – Maths – Unit NP11 – Ratio

Ratio Notation

A ratio is a relationship between two or more quantities. They are written in the form $a:b$, which is said "a to b".

For example, in a class, the ratio of boys to girls is $5:3$.

The bar model to the right is one way we can visualise this information.



My mathematical journey

What do I need to remember from before?	What will I learn about in this unit?	Where does this lead?
Multiplication and division; multiples and factors (NP3)	Using ratio notation	Combining ratios (NP13)
Writing values as a fraction; equivalent fractions (NP7)	Equivalent ratios and simplifying	Similar area and volume (GM8)
Ratio tables (NP10)	Ratios and fractions	Geometric sequences (A13)
	Finding values from parts or the whole	Advanced ratio (NP16)
		Vectors (GM10)

Simplifying Ratios and Equivalent Ratios

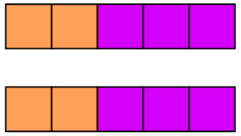
We can scale ratios up and down to make equivalent ratios or to simplify them.

O 

P 

Here we have some orange and purple tiles. They are in the ratio of $4:6$.

We can regroup these tiles into two equal groups of 2 orange tiles and 3 purple tiles.



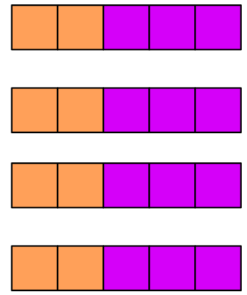
So, for every 2 orange tiles there are 2 purple tiles.

This can be written as the ratio $2:3$

$4:6$ ($\div 2$) $2:3$

We can produce the same result without the bar model, by identifying the HFC of the two parts of the ratio.

We could also make an equivalent ratio by repeating the pattern of orange and purple tiles.



We now have 8 orange tiles there are 12 purple tiles.

This can be written as the ratio $8:12$

$4:6$ ($\times 2$) $8:12$

We can produce the same result without the bar model, by multiplying both parts of the ratio by the same value

Year 9 – Maths – Unit NP11 – Ratio

Unit Ratios

You may be asked to express a ratio in the form $1:n$ or $n:1$.
These means you need to find an equivalent ratio where one of the parts is 1.

Example 1

Write the ratio $12:4$ in the form $n:1$

$$12:4 \xrightarrow{\div 4} 3:1$$

In order to get the second number in the ratio down to 1, you would need to divide it by 4.
Therefore, we need to do the same thing to the first part of the ratio.

Example 2

Write the ratio $4:6$ in the form $1:n$

$$4:6 \xrightarrow{\div 4} 1:1.5$$

This time we need the first number in the ratio to become 1, in order to do this you would need to divide it by 4.
Therefore, we need to do the same thing to the second part of the ratio.

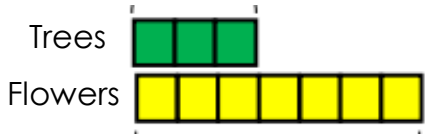
In this example, our result is no longer an integer, this is ok when we are asked to write it in the for $1:n$ or $n:1$.

Ratios as Fractions

You may also be asked to express a ratio as a fraction.

Example

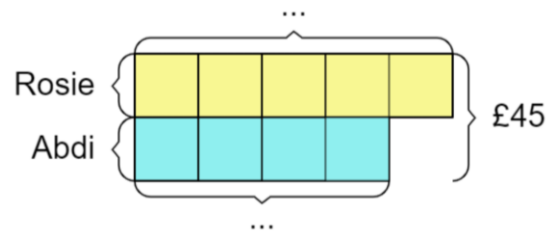
The ratio of trees to flowers is $3:7$. Express this as a fraction.



As a fraction

$$\frac{number\ of\ parts\ in\ group}{total\ number\ of\ parts} = \frac{3}{10}$$

Finding the Value of Parts of a Ratio



Finding parts of a ratio, give the whole

Rosie and Abdi share £45 in the ratio 5 : 4.
We could use a bar model to find how much each of them receives.

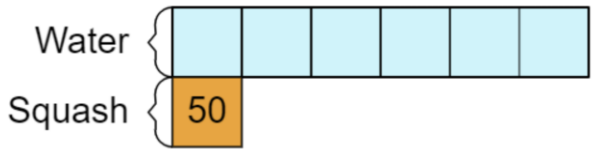
There are 9 parts in the ratio in total, so £45 needs to e shared equally into the bar model.

$$45 \div 9 = 5$$

Therefore, each box is worth £5.
So, Rosie get $5 \times 5 = £25$ and
Abdi gets $4 \times 5 = £20$

Finding parts of a ratio, given another part

Jamal is making orange squash.
He needs to mix squash : water in the ratio 1 : 6.
He has already poured 50ml of squash into his glass.
How much water should he use?
In this diagram we can see one box is worth 50ml, this means every box must be worth 50ml.
So, we need $6 \times 5 = 30$ml of water.



Finding parts of a ratio, given the difference

Zainab and Omar are sharing some sweets in the ratio of their ages, 7 : 9.
Omar receives 4 more sweets than Zainab.
We could use a bar model to help us find how many sweets each of them receives.



In this example, you can see that the two extra boxes in Omar's row are worth 4 in total.
Therefore, each box must be worth 2.
Which means, Zainab has $7 \times 2 = 14$ sweets
And Omar has $9 \times 2 = 18$ sweets.

Year 9 – Maths – Unit SP2 – Bivariate Data & Time Series

My mathematical journey

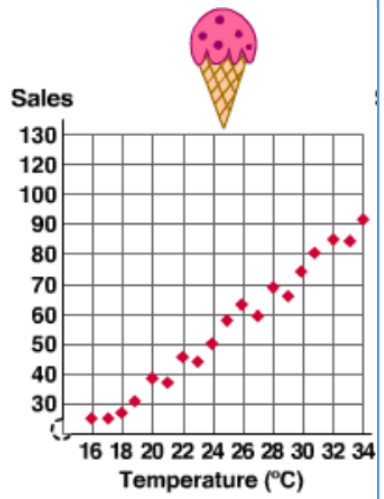
What do I need to remember from before?	What will I learn about in this unit?	Where does this lead?
Reading tables (SP1) Interpreting graphs and charts (SP1) Mean (SP1)	Drawing and reading scatter graphs Identifying and interpreting correlations Drawing and using lines of best fit Drawing and reading time series graphs	Advanced data analysis (SP4, SP5) Data analysis in geography, science, psychology, business, economics and more Correlation and regression analysis (A Level Maths)

Scatter Graph

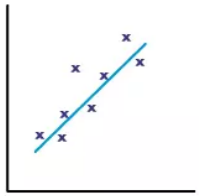
A scatter graph is a diagram where points are plotted to show the relationship (correlation) between two variables.

The value of one variable is shown along the x-axis and the values of the second variable is shown on the y-axis.

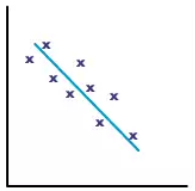
The scatter graph to the right shows the temperature compared with the number of ice-creams sold.



Positive Correlation

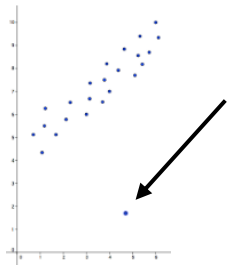


Negative Correlation



No Correlation





Outlier

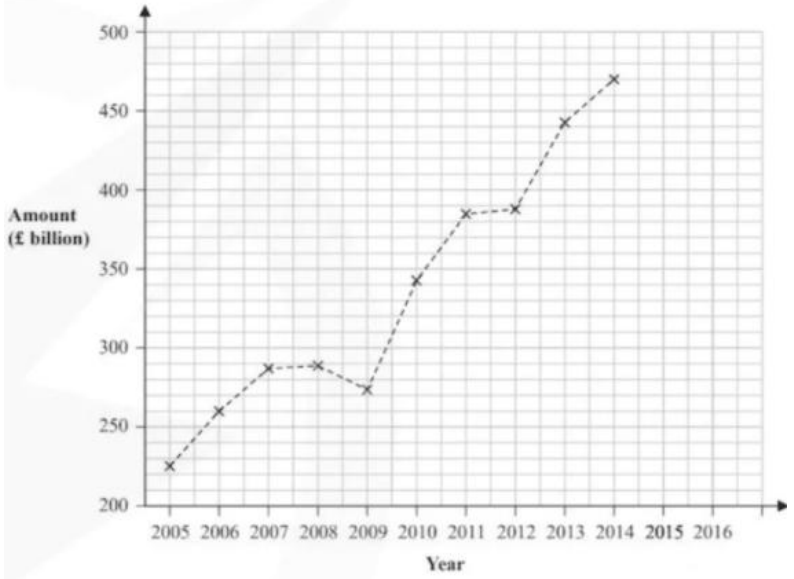
Time – series graph

Time series graphs show data fluctuations over time and are used to predict trends, cycles and seasonality.

Example

The time series graph below shows the amount of money invested by a company between 2005 and 2014.

The general trend of the graph is an increase in the amount of money invested over time.



Exams!

- When interpreting scatter graphs always refer to what the graph is showing. For example "it has positive correlation so the hotter it is the more ice creams that are sold"

Exams!

- Once all points have been plotted, ALWAYS draw a line of best fit. (Scatter graph)
- Use line of best fit to estimate answers.

Keyword/Skill	Definition/tip
Variable	A quantity that can change in value
Univariate data	data with one variable
Bivariate	data with two variables
Correlation	a mutual relationship between two variables, e.g. if one increases, so does the other
Outlier	a value on a scatter graph that doesn't fit with the pattern of the others
Line of best fit	a line on a scatter graph that shows the direction of increase/decrease and goes through the middle of the points
Interpolation	making a prediction by reading values from a line of best fit inside the range of known data
Extrapolation	making a prediction by reading values from a line of best fit outside the range of known data
Trend	a general pattern in some data (e.g. a general decrease over time)

Lines of Best Fit

The line of best fit is used to make estimates about the information in your scatter graph (this can be called interpolation).

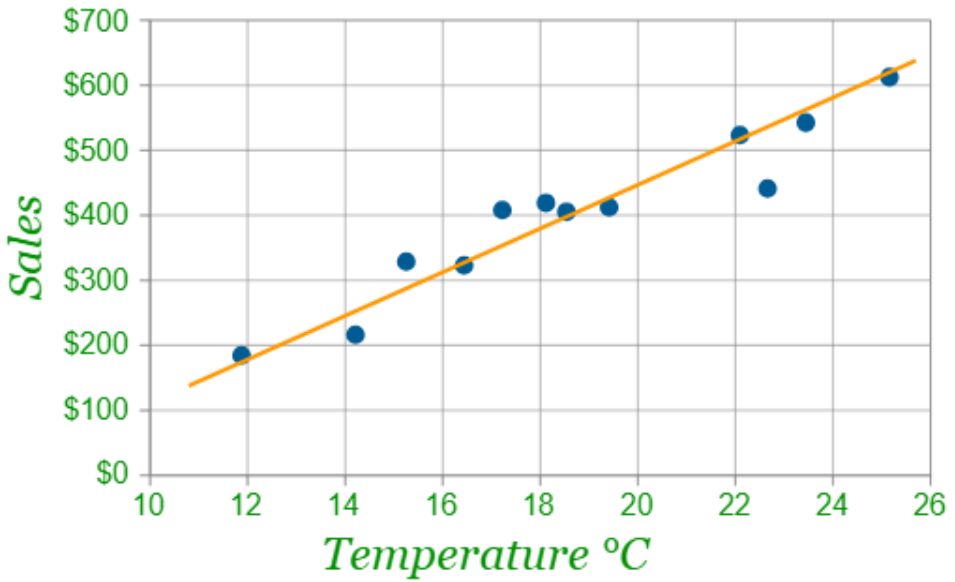
The line of best fit does not need to go through the origin (sometimes it may, but it doesn't have to!

There should approximately be the same number of points above and below the line. Sometimes it may not go through any points.

The line should extend across the whole graph.

It is only an estimate because the line is designed to be an average representation of the data.

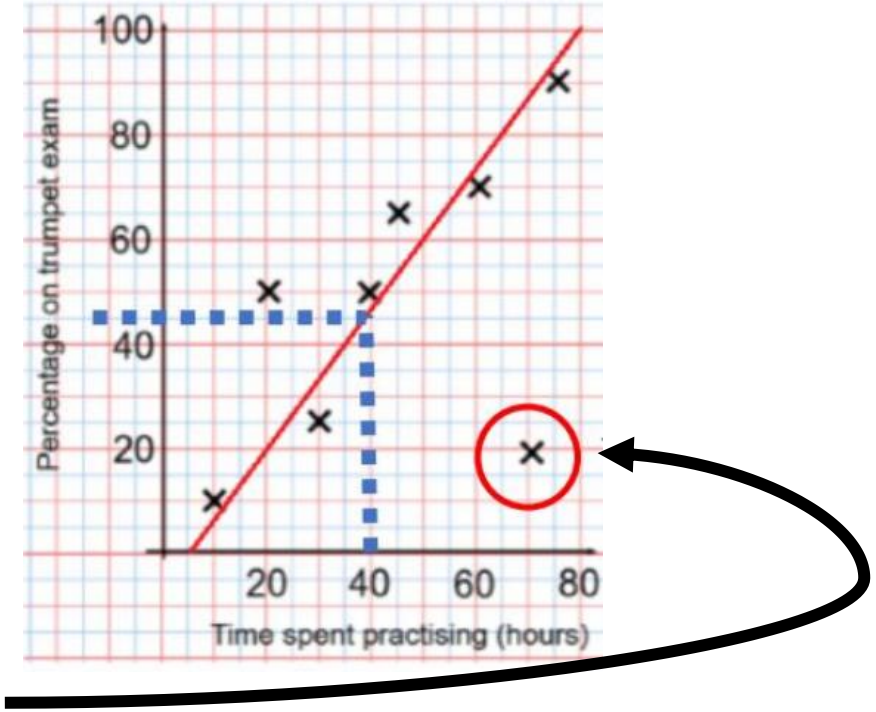
It is always a straight line.



Using a Line of Best Fit

Interpolation is using the line of best fit to estimate values inside our data point.

For example: 40 hours revising predicts a percentage of 45.



This point is an outlier. It is an outlier because it doesn't fit this model and stands apart from the data.

Extrapolation is where we use our line of best fit to predict information outside of our data. This is not always useful – in this example you cannot score more that 100%. So, revising for longer cannot be estimated.

Year 8 & 9 Science Knowledge Organiser - IOL12 – Photosynthesis

Lesson 1 – What is photosynthesis?

Key Terms

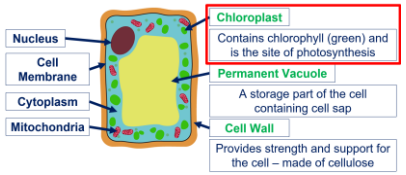
Chloroplast: Subcellular structure that contains chlorophyll and is the site of photosynthesis

Chlorophyll : Green pigment that absorbs the light needed to provide the energy for photosynthesis

Photosynthesis : An endothermic reaction in which energy is transferred from the environment to the chloroplasts by light, to produce glucose.

Endothermic - A type of chemical reaction that absorbs energy from the surroundings.

- Photosynthesis equation:
  Carbon Dioxide + Water → Oxygen + Glucose
- Carbon dioxide and water are the reactants needed for photosynthesis.
- Oxygen and glucose are the products made in photosynthesis.
- Chloroplasts are the site of photosynthesis
- Chloroplast contain a substance called chlorophyll which absorbs the light needed to provide the energy for photosynthesis
- Light energy is an endothermic reaction – energy is taken in and needed for photosynthesis to occur.



Lesson 2 – Photosynthesis reactants

Key Terms

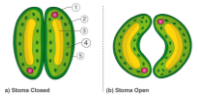
Stomata - A small hole in the bottom of a leaf that allows the diffusion of gases into and out of the cell

Diffusion - the movement of molecules from an area of high concentration to an area of low concentration, down the concentration gradient.

Guard cells - A specialised cell found in plants that controls the opening and closing of the stomata

We can summarise this series of reactions with a word equation:
Carbon Dioxide + Water → Oxygen + Glucose

- The reactants of photosynthesis are carbon dioxide and water.
- Carbon dioxide enters the leaves through diffusion from - the air, through the stomata – holes at the bottom of the leaf.
- The stomata can open and close.
- This opening and closing is controlled by
- specialised cells called guard cells.



- Plants found in deserts have fewer stomata compared to those found in humid climates.

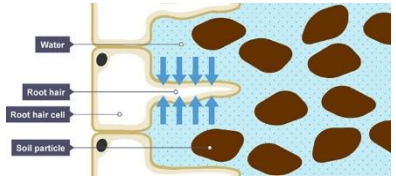
Lesson 4 – Moving water

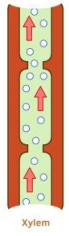
Key Terms

Xylem - A specialised cell found in plants that carries water up the plant from the roots

Root hair cell – specialised cell used to absorb water from soil.

- Water is absorbed from the soil into the roots
- Root hair cells increase the surface area to increase the absorption of water
- Water travels through the plant by the xylem tissue
- In the leaf, the water moves out of the xylem, to the palisade cell for photosynthesis



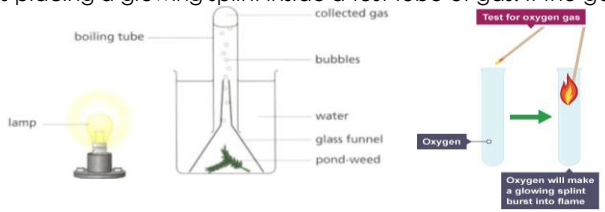


Lesson 5 – Photosynthesis products

Key Terms

Give - only a short answer is required, not an explanation or a description

- Oxygen is a product of photosynthesis
- When plants photosynthesise, bubbles of oxygen are produced which can be collected to test for the presence of oxygen.
- The test for oxygen is placing a glowing splint inside a test tube of gas. If the gas is oxygen, the splint will relight

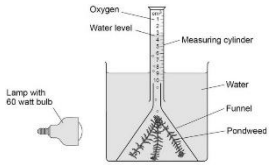


Lesson 3 & 6 – Investigating factors affecting photosynthesis

Suggest : This term is used in questions where students need to apply their knowledge and understanding to a new situation.

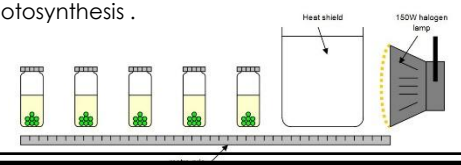
Pattern : A regular and intelligible form or sequence that can be found.

- An anomalous result is a results that doesn't fit in with the pattern of the other results.
- The resolution is the smallest accurate interval on the measuring device you can measure to. This determines uncertainty.
- When plants photosynthesise underwater, they produced bubbles of oxygen that can be counted to determine rate.



- Hydrogen carbonate solution can be used to provide carbon dioxide for photosynthesis for aquatic plants.
- Hydrogen carbonate solution acts as an indicator and changes colour when CO_2 is present / absent.

- The more carbon dioxide available, allows more photosynthesis to occur.
- The further away from the light source the plant is, the less light can be taken in for photosynthesis .



Lesson 7 – Photosynthesis Vs Respiration

Key Terms

Respiration - exothermic chemical reaction that occurs in living cells, where energy is released from glucose.

Exothermic - A type of chemical reaction that transfers energy to its surroundings.

Mitochondria - an organelle where aerobic respiration takes place, releasing energy for the cell

- The products of cellular respiration are carbon dioxide and water, whereas these are the reactants of photosynthesis
- Respiration is exothermic but photosynthesis is endothermic
- Photosynthesis requires light but respiration does not.
- Cellular respiration happens in the mitochondria
- Photosynthesis happens in the chloroplasts
- Cellular respiration happens in all living things, but photosynthesis happens only in plants.
- Photosynthesis occurs during the day. Respiration occurs all day and night.
- Respiration:

We can summarise this series of reactions with a word equation:
Oxygen + Glucose → Carbon Dioxide + Water

- Photosynthesis:

We can summarise this series of reactions with a word equation:
Carbon Dioxide + Water → Oxygen + Glucose

Year 8 & 9 Science Knowledge Organiser – BOM9 – The Periodic Table

Lesson 1 – Metals and Non-metals

Key Terms

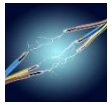
Ductile : able to be deformed without losing toughness; pliable, not brittle.

Malleable : able to be hammered or pressed into shape without breaking or cracking.

Sonorous : capable of producing a deep or ringing sound.

Groups : vertical columns on the Periodic Table containing elements with similar chemical properties

- Metals can be categorised by a variety of properties that they do not share with non-metals
- Metals are shiny, strong and solid at room temperature. Other common properties of metals include: ductile , high melting points, high boiling points, sonorous , conducts electricity, conducts heat
- All metals conduct electricity but some non – metals are also able to do so such as graphite.





Lesson 2 – Metal and Non-Metal Oxides

Key Terms

Oxide : A compound consisting of oxygen with another element

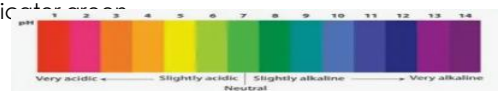
Explain: Give a reason or reasons to show why something happens or how something works.

Observe : Notice or perceive (something) and register it as being significant.

- Oxidation occurs when an element reacts with oxygen
- When metals react with oxygen, they form metal oxides.
- Metal oxides will dissolve in water to form an alkaline solution. This will turn universal indicator blue/ purple

- When non-metals react with oxygen they form non-metal oxides.
- Non-metal oxides will dissolve in water to form an acidic solution. This will turn universal indicator yellow / red

- Solid metal oxides are bases and will neutralise an acid. This will turn universal indicator green



Lesson 3 – Mendeleev the Genius

Key Terms

Groups : vertical columns on the Periodic Table containing elements with similar chemical properties

Periods : Horizontal rows on the Periodic Table displaying repeating chemical properties

Periodicity: when something repeats after fixed interval.

- Mendeleev arranged elements in order of atomic mass in periods (rows).
- Mendeleev left gaps in his Periodic Table to ensure that elements were positioned based on their chemical properties.
- A group (column) on the Periodic Table contains elements with similar chemical and physical properties.

Lesson 4 – Group 1 – The Alkali Metals

Key Terms

Alkali metals : Elements found in group 1 that react with water to produce a metal hydroxide (Alkaline)

Alkaline: A substance with a pH greater than 7

Li	Lithium
Na	Sodium
K	Potassium
Rb	Rubidium
Cs	Cesium
Fr	Francium



- Group 1 are called the alkali metals as they all metals react with water to form an alkali solution.
- Group 1 metals display different properties as expected from a metal such as a dull appearance, lower melting and boiling points and are soft rather than hard.
- The reactivity of the alkali metals increases as you go down the group
- An alkali metal will react with water to produce a metal hydroxide and hydrogen gas: Metal + water → metal hydroxide + hydrogen

Metal + water → metal hydroxide + hydrogen

- Alkali metals will float on water due to their low density

Lesson 5 – Group 0 – The Noble Prize-Winning Noble Gases

Key Terms

Noble gases : Elements found in group 0 that are unreactive (inert)

Inert : Chemically unreactive

He	Helium
Ne	Neon
Ar	Argon
Kr	Krypton
Xe	Xenon
Rn	Radon

- Group 0 are called the noble gases
- Group 0 elements are chemically unreactive (inert) this is because they have a full outer shell of electrons
- Group 0 elements have a wide range of uses including

1. Helium being used for balloons and airships
2. Neon being used for lights
3. Argon used to house reactive elements
4. Radon used for medical treatments

Lesson 6 – Group 7 – The Halogens

Key Terms

Halogens : Elements found in group 7 that are toxic and are often involved in displacement reactions

Toxic: Poisonous

Acidic: A substance with a pH lower than 7

F	fluorine
Cl	chlorine
Br	bromine
I	iodine
At	astatine

- Group 7 are called the Halogens
- Group 7 elements are toxic and will dissolve in water to form an acidic solution
- The physical properties of the group 7 elements vary as you go down the group. At room temperature…

1. Fluorine is a yellow gas
2. Chlorine is a green gas
3. Bromine is a red brown volatile liquid
4. Iodine is a volatile purple solid

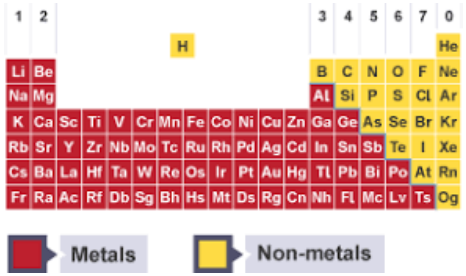
Year 8 & 9 Science Knowledge Organiser – BOM9 – The Periodic Table

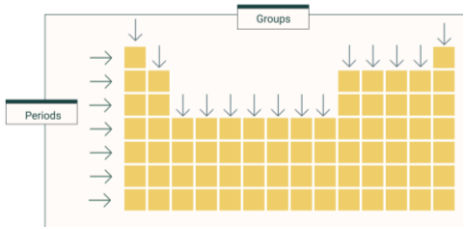
Lesson 7 – Mendeleev's Legacy

Key Terms

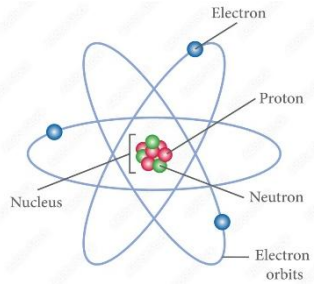
Proton : A subatomic particle

Subatomic : Anything small than an atom





- Ernest Rutherford had discovered a new particle that existed within an atom called it a proton.
- Every element had a specific number of protons. E.g. Hydrogen had 1 proton; oxygen had 6 protons.



- The modern Periodic Table is ordered by the number of protons – atomic number.
- Atomic weight is now known as relative atomic mass
- Metals are on the left-hand side of the modern Periodic Table. Non-metals are on the right-hand side of the modern Periodic Table.

- Elements are still grouped by chemical properties
- Elements are still in periods (repeating chemical properties

Year 8 & 9 Science Knowledge Organiser – OEOO7: Changing forces

Lesson 1 – Resultant forces

Key Terms

Represent: Depict or symbolize something in a meaningful way. In science, you might represent data, phenomena, or concepts using various models, diagrams, or symbols

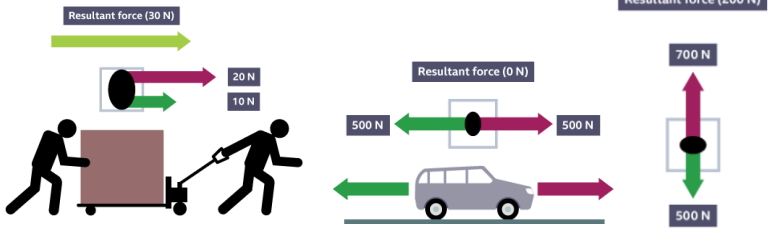
Calculate: To figure out a numerical value through mathematical operations or formulas.

Use: To apply something for a specific purpose

Resultant force: Single force that has the same effect as all the original forces acting together

Magnitude: The size, scale or amount of something.

- When there is more than one force acting on an object in the same direction we can represent this with a single overall force called a resultant force
- When there is more than one force acting on an object in opposite directions, the resulting forces depends on whether those forces are balanced or unbalanced



Lesson 2 – Deformation

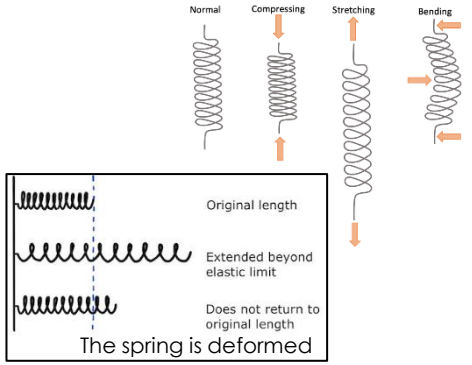
Key Terms

Deform: Changing the shape or structure of something

Extension: increase in length when a stretching force is applied

Compress: the decrease in the length of a spring (or other elastic object) caused by two or more forces acting towards each other.

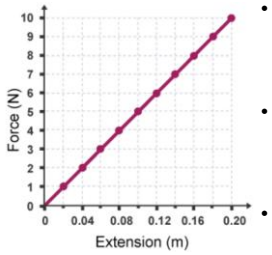
- When a force is placed on a material, it may stretch or compress
- Elastic materials will often return to their original shape when the force is removed
- Springs will extend when a force is applied
- Deformation is the point at which an elastic material will no longer retain its shape, even when the force is removed



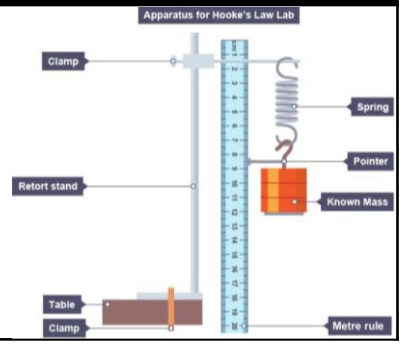
Lesson 3 & 4 – Compulsory practical: Hooke's Law

Key Terms

Directly proportional: This means that as one variable increases, the other variable also increases at the same rate.



- When the forces acting on an object are unbalanced, the objects motion or shape will change
- Extension is directly proportional to the force represented by a straight line through the origin
- Hooke's law states "the amount a spring is stretched is directly proportional to the force applied"



Lesson 5 – Work done (as deformation)

Key Terms

Work done: the amount of energy transferred when a force is applied to stretch or compress it

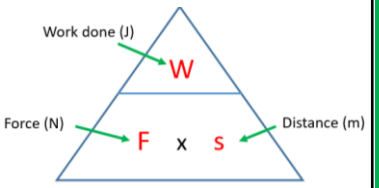
- The unit to measure work done is Joules, J
- Work done is the energy transferred in moving a force over a distance
- If an object is not moved, no work will be done

Worked example

Calculate the work done when an object is lifted 2m in the air with a force of 0.35N

Work done = Force x distance

2 x 0.35 = 0.7 J



Work done (J) = Force (N) x Distance (m)

The distance must be in the line of action of the force

Lesson 6 – Turning forces (moments and levers)

Key Terms

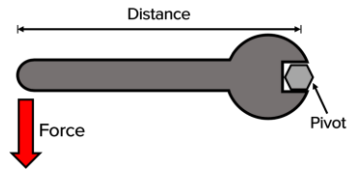
Moment: the turning effect of a force

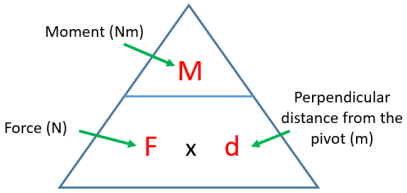
Rotate: To rotate means to turn or spin around an axis or pivot point

Pivot: a fixed point around which something turns or rotates

Lever: simple machine that transmits and multiplies the turning effect of forces. It acts as a "force multiplier," allowing a small input force to exert a much larger output force by rotating around a fixed point.

- Balanced forces describes when opposing forces are equal or balanced.
- A force that causes an object to rotate is called a moment
- An object may rotate around a fixed position called a pivot
- Levers are examples of simple machines. An example of a lever is a spanner.





Moment (Nm) = Force (N) x Distance (m)

The distance must be perpendicular from the line of action of the force to the pivot.

Lesson 7 – Compulsory practical: Investigating moments

Key Terms

Perpendicular: "at a right angle" or a 90 degree angle to a specific surface, line of action, or vector.

Moment: the turning effect of a force

Method:

- Place an object at 10cm from the end
- Keep the Pivot fixed at 25cm from the end
- Start by sliding the mass from above the pivot along the ruler (away from the pivot)
- Measure the perpendicular distance between the mass and the pivot
- Work out the moment (of the mass)



Year 9 Science Knowledge Organiser – OEOO8 Magnetism

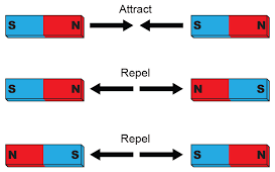
Lesson 1 – Bar magnets and magnetic fields

Key terms

Magnetic field - An area around magnet in which a magnet or magnetic material experiences a force.

Non-contact forces – are forces that act between two objects that are not physically touching each other.

Qualitative data – data that are observations, rather than numerical data.



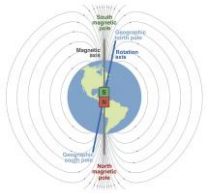
- A magnet is an object that produces a magnetic field
- Magnets have two poles (ends); the north (seeking) pole, and the south (seeking) pole. Magnets attract and repel each other and attract some materials and not others.
- When two of the same poles (e.g North and North) are placed close together, they repel (push apart) each other.
- When two different poles are close, (e.g. North and South) they attract (pull together) each other.
- A magnetic force is a non-contact force. An example of a non-contact force between a magnet and a magnetic material
- A magnetic field is the area around a magnet in which another magnet experiences a force.
- A non-permanent magnet is referred to as an induced magnet (or temporary magnet)
- Permanent magnet - is a material that produces its own constant magnetic field, e.g. magnet

Lesson 2 – Magnetic Earth

Key Terms

Compass – a bar magnetic balancing on a pin

Aroura borealis - A natural light show resulting from the release of energy from solar radiation that has been caught in the Earth's magnetic field – often called the Northern lights.

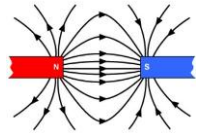


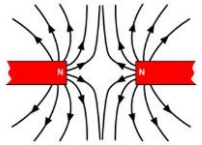
- The Earth is almost a sphere and is made up of three main layers: the core, the mantle and the crust.
- The inner core of the Earth is a solid sphere made of iron and nickel.
- As a result of the iron in the Earth inner core, the Earth generates its own magnetic field.
- When we use a compass on Earth, the needle of the compass aligns itself with magnetic field and shows us which direction is "North".
- The magnetic field around the Earth is vital to life on Earth. It protects us from dangerous solar energy released by the sun. However, some of the energy is "caught" in the magnetic field and causes the Aroura Borealis (The Northern Lights).
- True north is the geographical north pole. This is the point at which the lines of longitude meet at the most northerly point on the planet.
- Magnetic north is the direction the compass needle points to as it aligns with the Earth's magnetic field.

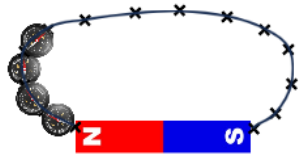
Lesson 3 – Modelling magnetic field

Key Terms

Magnetic field - the area around a magnet in which another magnet experiences a force.







A plotting compass can be used to map the magnetic field around a bar magnet.

When we draw the magnetic field around a magnet there are some rules:
- Always draw them with a pencil
- Start at the North pole, and go to the south pole
- Use an arrow to indicate the direction of the force
- The field lines should never cross
- They should be closer at the poles

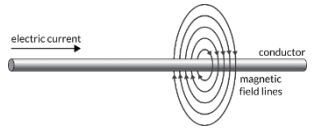
Like poles (north pole with north pole, or south pole with south pole) will repel each other.
Opposite poles (north pole with south pole) will attract each other.

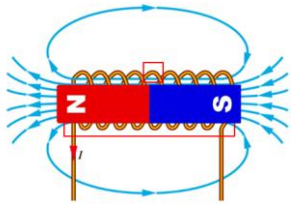
Using a compass to draw a magnetic field
1. Place the magnet in the middle of the page and sketch around it (so you know where it goes if it moves)
2. Pick a point touching the north pole of the bar magnet and draw a little cross.
3. Place the plotting compass with the south end of the compass pointer at the cross you've drawn.
4. Draw a cross where the north tip of the compass is pointing.
5. Move the compass so the south tip is at the new cross.
6. Continue until your get back to the magnet.
7. Draw a smooth curve connecting the crosses
8. Repeat this for a few points on touching the north pole.

Lesson 4 – Electromagnetism

Key Terms

Electromagnet - A type of magnet that uses an electric current to produce a magnetic field.



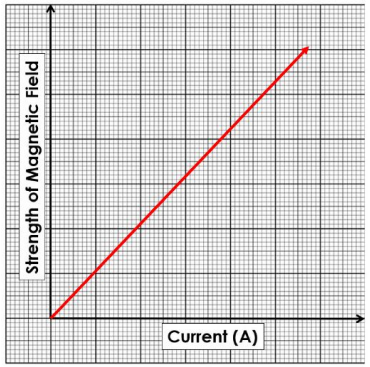


- When an electric current flows through a wire, it produces a magnetic field around that wire.
- The strength of that magnetic field will be directly proportional to the magnitude of the current flowing through the wire.
- Double the wires, double the magnetic fields – stronger force!
- A current carrying wire, wrapped into a coil, produces a magnetic field similar in shape to a bar magnet
- To make an electromagnet, we can stack lots of wires on top of one another to increase the strength of the magnetic field. To do this, we wrap a wire into a coil.

Year 9 Science Knowledge Organiser – OEOO8 Magnetism

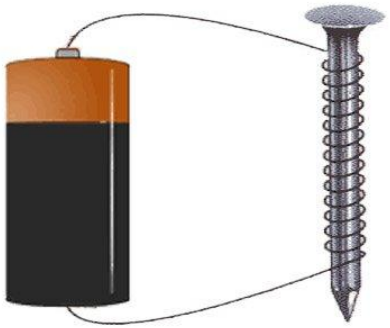
Lesson 5 – Investigating electromagnets

Key terms



Magnetic field - is the area around a magnet in which another magnet experiences a force.

Electromagnet - A type of magnet that uses an electric current to produce a magnetic field.



- When an electric current flows through a wire, it creates a magnetic field around that wire.
- The strength of the magnetic field in the wire will be directly proportional to the magnitude of the current flowing through the wire.
- We can make an electromagnet by stacking lots of wires on top of one another to increase the strength of the magnetic field. To do this, we wrap a wire into a coil.
- There are two other factors that affect the strength of the magnetic field produced by an electromagnet
  - The number of turns in the coil of wire.
  - Whether or not the wire is wrapped around an iron core.

Electromagnets Practical:

- Wrap a piece of iron in a coil of wire and then connect the wire to a variable power supply.
- When you turn on the power supply, you are going to see if there is a pattern between the current and how many steel paper clips you can pick up using your electromagnet.
- The more turns in the coil the better – just make sure it's the same each time.
- Always turn off the power supply between tests.
- Start on the lowest potential difference, and increase to increase the current in the wire
- Do not go above 6V on the power supply.
- You need to include an ammeter in your circuit to measure the current each time.

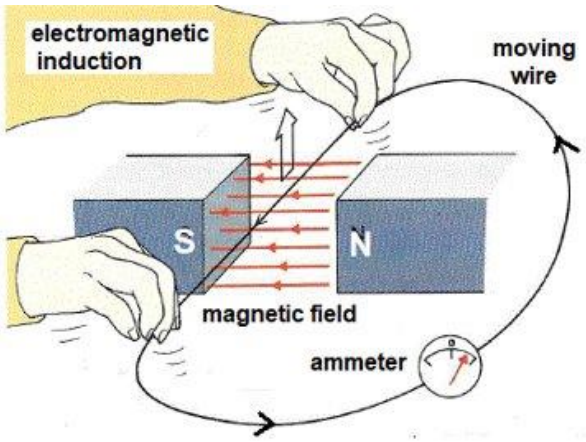
Lesson 6 – DC Motors

Key Terms

DC Motor - A device that utilises the motor effect to bring about movement.

Magnetic field - is the area around a magnet in which another magnet experiences a force.

- If we put a magnet, or a magnetic material, in a magnetic field, magnetic force acts on it – it will change speed, direction or shape!
- With electromagnets, we can control that magnetic field, and control how things move.
- This is because when a current flows in a wire it produces a magnetic field
- This magnetic field will interact with another magnetic field – like two magnets coming together.
- Electric cars, lawnmowers, a fan; all contain motors (electromagnets in motion)
- The movement of a current carrying wire in a magnetic field is called the motor effect.
- Electric cars work using DC motors.
- They use electric current to produce magnetic fields.
- They then use interacting magnetic fields to generate magnetic force, pushing the wheels forward.



Year 9 Science Knowledge Organiser – IOL13 Interdependence

Lesson 1 – Levels of an Ecosystem

Key terms

Organism – An individual living member of a species

Population – organisms of the same type living in the same place.

Community – the different population of organisms living and interacting in the same place.

Ecosystem - made up of a biological community and the physical environment in which the community lives.

Interdependence- How organisms interact with each other and the environment in which they live

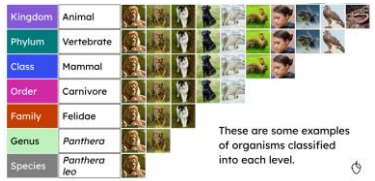
Interdependence is when organisms in an area need each other for resources, e.g. for food and shelter. Organisms are interconnected.

For example, wolves were reintroduced into Yellowstone national park. This reduced deer numbers, which allowed plants/trees to grow back. This improved habitats and food sources, and even stabilised riverbanks, benefiting the whole ecosystem.

Lesson 2 – Levels of Classification

Key Terms

Species - A group of similar organisms that can interbreed to make fertile offspring



Classification is the organisation of living things into groups according to their similarities (physical traits, behaviour, diet, DNA).

Organisms have binomial scientific names: ***genus + species***. (First part of the name refers to the genus and the second part of the name refers to the species).

For example, humans are ***homo*** (genus) ***sapiens*** (species)

Lion is a ***panthera*** (genus) ***leo*** (species)

Lesson 3 – Food Webs

Key Terms

Food web – shows the interdependence of organisms based on their interconnecting food chains.

Predator – An organism that hunts/kills other organisms.

Prey – An organism that is hunted/killed by a predator.

Producer – An organism that produces its own 'food' through photosynthesis.

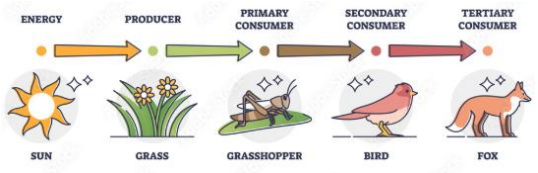
Decomposer - an organism that breaks down dead matter and feeds on it.

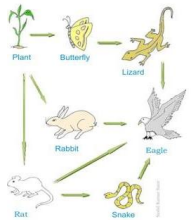
Herbivore – an organism that only eats plants.

Biomass- The total mass of living material in an ecosystem

- Food chains always begin with a producer.
- The arrow means 'consumed by'.
- At the top of the chain is the top predator, which is not hunted/killed by any other organism.
- Several interlinking food chains can combine to make a food web.

Producers – make their own food.
Primary consumers – eat producers.
Secondary consumers – eat primary consumers.
Tertiary consumers – eat secondary consumers.





- When organisms die, their biomass is broken down by decomposers and nutrients returned to the soil. Nutrients absorbed by producer to help increase biomass.

Calculating percentage of biomass transferred:

$$\frac{\text{Biomass of next organism}}{\text{Biomass of original organism}} \times 100$$

Lesson 4 – Food Security

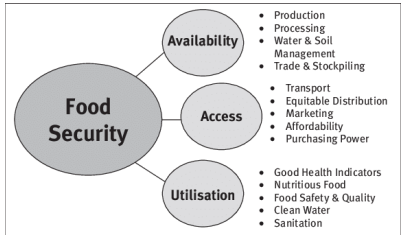
Key Terms

Food security - having enough affordable and nutritious food in an area or country

Water Poverty – not having access to enough clean, safe drinking water

Pollination - The fertilisation of flowers by the transfer of pollen from one to another, allowing plant reproduction.

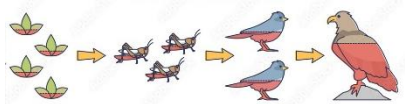
- Amount of food able to grow can be affected by population growth, climate change, limited land, extreme weather, pests and pathogens, conflict, pollinator decline.
- Pollination is vital for plant reproduction, allowing more plants (like fruits, nuts and vegetables) to grow, meaning more food is available.



Lesson 5 – Bioaccumulation

Key Terms

Bioaccumulation – the gradual build up of toxins in a food chain, often causing harm to organisms at the top of the chain.



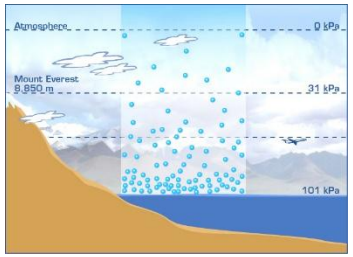
- As you move up the food chain the toxic chemicals become more concentrated, so top predators are most affected by bioaccumulation.
- DDT is a toxic pesticide that was used in the 1950s to kill pests on farms and malaria carrying mosquitos – led to steep decline in birds/fish This was due to the increased concentration of the DDT as you move up the food chain because of bioaccumulation.
- **Toxin Concentration (ppm) = Initial Concentration (ppm) x 10**

Year 9 Science Knowledge Organiser – OEOO9 Gas Pressure

Lesson 1 – Atmospheric Pressure

Key Terms

Atmospheric pressure – caused by air particles hitting surfaces, creating a force because of the weight of the air above.



- The Earth's gravity pulls air particles down, forming the atmosphere. These particles collide with surfaces, creating pressure.
- Air pressure decreases as height increases (e.g. on mountains). This is because there are fewer air particles above you at higher altitudes.
- Pressure increases with depth in a fluid (liquid or gas). Closer to Earth's surface, particles are closer together, so pressure is greater.
- In fluids, pressure pushes equally in all directions (not just downward). This explains why pressure doesn't change inside a cave.
- When particles are closer together and moving fast, pressure increases.
- Example: in the collapsing can experiment, cooling steam reduces internal pressure, so higher external air pressure crushes the can.

Lesson 2 – Floating and sinking

Key Terms

Density – How heavy an object is for its size (the number of particles in a given volume).

Observe – Notice or perceive (something) and register it as being significant.

Upthrust – the upward force that a fluid exerts on a body within it.

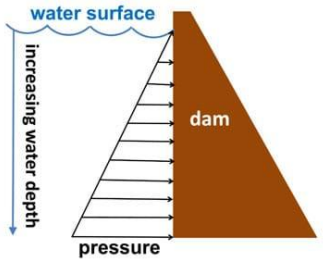
Explain – Give a reason or reasons to show why something happens or how something works.

- Any object in water (or another fluid) experiences weight acting downwards and upthrust acting upwards.
- Upthrust happens because pressure in a fluid increases with depth, so the force pushing up on the bottom of an object is greater than the force pushing down on the top.
- If upthrust ≥ weight, the object floats (it may be partly or fully underwater). If weight > upthrust, the object sinks.
- Heavy objects (like ships) can float, and light objects (like stones) can sink. Weight or size on their own do not decide floating.
- Objects float if their density is lower than the fluid's density.
- Objects sink if their density is higher than the fluid's density.
- Objects can float even when fully underwater

Lesson 3 – Pressure in liquids

Key Terms

Pressure – pressure is the force acting per unit area



- The deeper you go underwater, the greater the pressure because there is more liquid above pushing down.
- At any given depth in a liquid, the pressure is equal in all directions, regardless of the container shape or size.
- Liquids act like fluids (similar to air)Like gases, liquids exert pressure in all directions, not just downward.
- Objects experience greater pressure underneath than above, creating an upward force that can make them float.
- Objects float if the upthrust balances or exceeds their weight, linking to previous learning on density.
- Examples include dams being thicker at the bottom and divers experiencing strong pressure at depth, showing how pressure affects structures and people.

Lesson 4 – Calculating pressure

Key Terms

Surface area- the area of an outer part or uppermost layer of something.

Example: A man *sits on a chair with a weight of 600 N. He takes up an area of 0.5m². Calculate the pressure that the man exerts on the chair.*

$$Pressure\ (N/m^2) = \frac{Force\ (N)}{Area\ of\ surface\ (m^2)}$$

$$Pressure\ (N/m^2) = \frac{600\ N}{0.5\ m^2}$$

$$Pressure\ (N/m^2) = 300\ N/m^2$$

- Pressure is force spread over an area. It tells you how concentrated a force is on a surface.
- The formula for is ***Pressure (Pa) = Force (N) ÷ Area (m²)***

To find pressure	To find force	To find area
F / P × A	F / P × A	F / P × A
$P = \frac{F}{A}$	$F = P \times A$	$A = \frac{F}{P}$

- Force is measured in Newtons (N) and area in m².
- Pressure is measured in Pascals (Pa).1 Pascal = 1 N/m².

- Area affects pressure:
- Smaller area → higher pressure (e.g. sharp pencil pops a balloon).
- Larger area → lower pressure

Lesson 5 – Resistance to motion in fluids

Key Terms

Drag – a force acting opposite to the relative motion of any moving object moving with respect to a surrounding fluid.

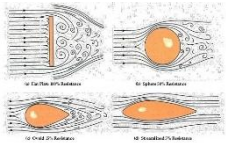
Fluid – a substance that has no fixed shape and is able to flow

- A fluid is a liquid or gas. Particles in fluids can move freely, so objects move through them by pushing particles out of the way.
- When an object moves through a fluid, two main forces act: Gravity (weight) pulls it down, Drag (air resistance) pushes against motion
- Drag is a force that opposes motion in a fluid. When falling through air, drag is called air resistance.
- As an object moves, it pushes fluid particles away. The particles push back with an equal and opposite force, slowing it down. Energy is transferred from the object to the fluid particles.
- Thicker fluids (e.g. oil) cause more drag than thinner ones (e.g. air).Faster movement → more drag. Larger surface area (bigger objects) → more drag.

Lesson 6 – Reducing drag

Key Terms

Streamline – design or provide with a form that presents very little resistance to a flow of fluid, increasing potential top speed and ease of movement.

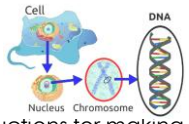


- When an object moves through a fluid (air or water), it must push particles out of the way, which creates resistance (drag).
- More drag means less speed/efficiency. Energy is transferred from the moving object to the fluid particles, slowing the object down.
- Objects with a larger surface area in the direction of motion push more particles away, increasing drag (e.g. parachutes).
- Shaping objects so they are smooth and narrow helps them push fluid particles gently to the side, reducing resistance.
- It can only be eliminated in a vacuum (where there are no particles), but in air or water we can only reduce it.
- Lower drag allows objects (like cyclists, planes, and cars) to move faster and use less energy.

Year 9 Science Knowledge Organiser – BBL5 Inheritance and Evolution

Lesson 1 – Genome

Key terms



Chromosome - A very long molecule of DNA

Genome - The entire DNA of an organism

Gene - A region of a genome used by cells as instructions for making proteins

DNA - A chemical compound mainly found in the nucleus of cells

A genome is the entire genetic material (all the DNA) of an organism.
It is divided into individual chromosomes found inside the nucleus of a cell. A gene is a small section of DNA that codes for a specific protein.
Chromosomes are thread-like structures made of DNA, located in the nucleus of a cell.
They carry genes that dictate the characteristics of an organism. In humans, body cells contain 46 chromosomes (23 pairs), with one set inherited from each parent.
The scientists responsible for formulating the model structure of DNA as Watson and Crick.

Lesson 2 – COMPULSORY PRACTICAL – Extracting DNA from fruit

Key terms

Chromosome - A very long molecule of DNA

DNA - A chemical compound mainly found in the nucleus of cells

DNA can be extracted from fruit e.g. strawberries.
Strawberries can have up to eight copies of each chromosome and so contain a lot of DNA.
When extracted from the strawberry this volume of DNA means it is visible to the naked eye as white threads.

- Crush the fruit using a pestle and mortar to break open the cell in the fruit.
- Mix the fruit with a solution of salt, detergent and water. Detergent break open the membranes to release DNA and salt causes the DNA to clump together.
- Put into the water bath for 10 minutes.
- Filter the mixture to separate the insoluble pieces and froth.
- Drizzle ice cold ethanol down the inside of the beaker to precipitate the DNA

Lesson 3 – Heredity

Key Terms

Heredity: Genetic information passed down from parents to offspring.

Gametes - Sex cells (egg or sperm)

Inherited variation -differences between individuals that are inherited from parents, such as the colour of your eyes, hair and skin.

Offspring are normally similar, but not identical, to their parents.
Offspring get one set of chromosomes from their biological mother, and one set from their biological father.
In humans, the gametes (the egg and sperm) have half the normal number of chromosomes (23) .
When the two gametes fuse during sexual reproduction, it makes a zygote with full genome with 23 pairs (46 in total). This develops into the embryo, where the genetic information from both parents is combined.
Characteristics are determined by genes, which are located on chromosomes.
Different versions of a gene are called **alleles,** and these dictate an organism's observable traits.

Lesson 4 – Variation

Key Terms

Variation - The differences in characteristics between individuals of the same species

Continuous Variation - Characteristics that can take any value within a range, with no distinct categories

Discontinuous Variation - Characteristics that fall into distinct, separate categories with no intermediates

Variation can be caused by the environment, genetics or both genetic and the environment.

Genetic Causes: Differences in the genes and alleles inherited from parents (e.g., blood type, eye colour).

Environmental Causes: Differences acquired from the conditions in which an organism develops and lives (e.g., scars, language, accent).

Combined Causes: Most traits (e.g., height, weight, intelligence) are a result of genes providing the potential, and the environment determining how that potential is expressed.

Lesson 5 – Natural Selection

Key Terms

Natural Selection – The process by which advantageous traits make an organism more likely to survive

Population – Organisms of the same species living in the same area at the same time

Traits – Specific physical or physiological characteristic of an organism, such as eye colour, fur colour, or blood type

Environmental Changes - Directly impact the distribution, survival, and biodiversity of species

Biotic factors – Living components of an ecosystem that affect other living organisms and shape the community

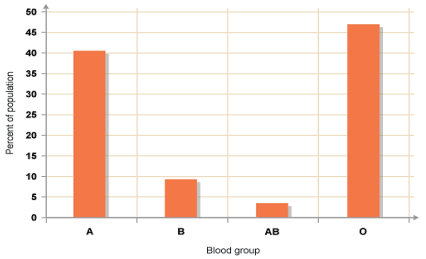
Abiotic factors - Non-living physical or chemical elements in an ecosystem that affect the size, distribution, and survival of organisms

- The process of Natural Selection involves mutation, variation, competition, survival of the fittest, reproduction & inheritance and evolution.

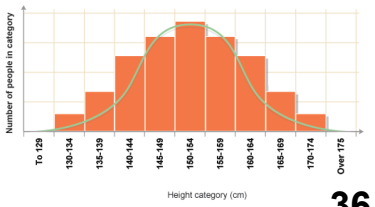
Biotic (living) factors: Availability of food, competition for resources (like mates or territory), predation, and disease.
Abiotic (non-living) factors: Light intensity, temperature, moisture levels, soil pH, and oxygen availability

1. **Genetic variation**: individuals show variation in characteristics due to differences in genes.
2. **Environmental change:** conditions in an area change – Lack of a resource (such as food) causes more competition between organisms
3. **Natural Selection**: Some individuals will have characteristics that are better suited to the environment and therefore, they are more likely to survive – 'survival of the fittest'
4. **Inheritance:** the survivors reproduce and pass on their genes to their offspring. The next generation contains more individuals with the 'better adapted variations'
5. **Evolution:** if the environmental conditions remain changed, natural selection occurs over and over again, and a new species evolves with all the individuals having the 'better adapted variations'

Discontinuous variation



Continuous variation



Year 9 Science Knowledge Organiser – BBL5 Inheritance and Evolution

Lesson 6 – Evolution and Extinction

Key Terms

Evolution - The gradual change of a population over generations



Evolution occurs via natural selection, where organisms better adapted to their environment survive, reproduce, and pass on their beneficial alleles to the next generation

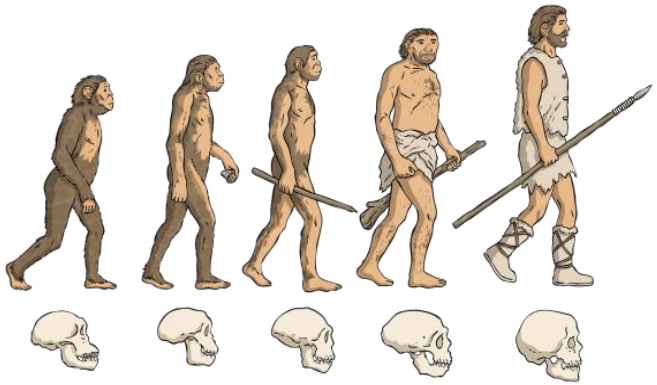
If a species does not adapt when their environment changes, they may not survive and become endangered, or extinct.

Evolutionary theories are backed by several strong pieces of physical and biological evidence : **Fossil Records and Antibiotic Resistance in Bacteria**

Extinction occurs when no living individuals of a species remain. Common causes include new diseases, new predators, extreme climate change, and human activities like hunting or deforestation.

Examples of extinct animals are the Dodo (Mauritius) ,Tasmanian Tiger (Thylacine) and Dinosaurs.

The Dodo was a flightless bird native to the island of Mauritius in the Indian Ocean.
With no natural predators, the Dodo thrived for thousands of years. However, when humans discovered Mauritius in the 16th century, the Dodo quickly became extinct.
This case study explores the factors leading to the Dodo's extinction and raises ethical questions about human responsibility in driving species to extinction.



Lesson 7 & 8 – Biodiversity and Conservation & Investigating Biodiversity

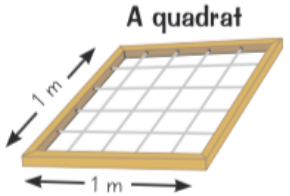
Key Terms

Biodiversity - describes the wide range of living things in a habitat or ecosystem

Conservation - Programs important to help maintain the biodiversity of the planet

Sampling- A type of scientific surveying which gives information on the distribution of populations of animals and plants

Quadrat - A 1 m^2 frame made of wood or metal, used to count plants or slow-moving animals, e.g. slugs and snails.



Biodiversity describes the wide range of living things in a habitat or ecosystem

The more variety of living things living in an area, the greater the biodiversity.
The less variety of living things in an areas, the less biodiverse an area

Conservation programs are there to protect species and ecosystems to maintain biodiversity.

Sampling method:

Mark out a 10m x 10m area in each location. Divide this area into 1m x 1m squares to create a grid.

Label the grid squares with coordinates

Use a random number generator to select 5 random grid coordinates from each area.

Place the quadrat at these coordinates in each area.

Within each quadrat, count and record the total number of individual organisms.

High Biodiversity



Low Biodiversity



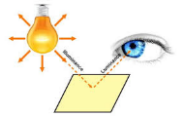
Year 9 Science Knowledge Organiser – BOE14 Light

Lesson 1 – Light vs Sound

Key Terms

Luminous- To emit its own source of light

Propagate - A spread out from one place to another



- Light and sound are both examples of waves. They both transfer energy from one place to another with transferring matter (stuff)
- Light and sound waves will both reflect at a boundary
- Light and sound waves can both be absorbed by materials
- Luminous objects emit light
- Light travels faster than sound.
- In a vacuum light travels at 300 000 000 m/s
- Light waves do not require a medium, will propagate in a vacuum
- Speed of sound in air is 340 m/s.

Lesson 2 – Reflection

Key Terms

Demonstrate : To show an understanding of a concept or idea through discussion, writing or drawings

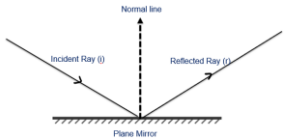
Ray - A single path of light

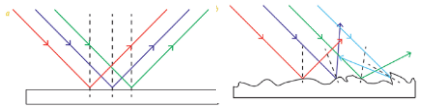
Beam - A group of many rays closely packed together

Specular reflection - To reflect from a plane mirror when i=r

Diffuse reflection - reflection from a rough or un-even surface

Normal line - A line draw at a right angle (perpendicular) to the boundary





Specular Reflection *Diffuse Reflection*

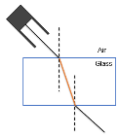
- A ray box is used to construct ray diagrams, they emit beams.
- **Proving that I = r**: Draw a dotted line (in pencil) Draw a dotted line at a right angle (perpendicular) to the plane mirror and label your line "normal line"
- Place a ray box and adjust the slits so you get a narrow, bright beam of light
- Shine the beam of light at the green dot where the normal line meets the plane mirror
- Use a pencil and make 4 dots along the beam and join these dots with a ruler (one straight line)
- Add arrows. Label your light ray "Incident Ray". Also known as (i)
- You will notice that the beams has been reflected off the mirror.
- Draw dots on the "reflected ray" and label the ray "reflected ray" (r)
- Take your protractor and determine angle i and r.
- **Specular reflection** happens on a smooth surface such as a mirror. Creating clear images.
- **Diffuse reflection** happens on a rough surface. Images are not clear, or visible at all.

Lessons 3 & 4 – Refraction

Key Terms

Describe - Recall events of facts in a specific way

Refraction - When a wave changes direction at the boundary between two different materials, due to a change in wave speed



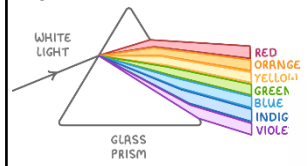
- Refraction occurs when light passes from one medium to another and as a result the light changes direction as it changes speed.
- As the ray propagates through the medium of air it meets the boundary of the block.
- As the light propagates through the block it changes direction.
- As the ray emerges from the block it will change direction. Emerging at the same angle from which it entered the block.

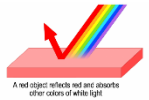
Lesson 5 – Colour

Key Terms

Demonstrate : To show an understanding of a concept or idea

Prism - A triangular block of transparent material (such as glass) used to refract light and split white light into a spectrum







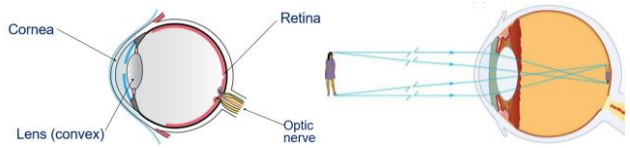


- White light is in fact made of 7 different colours. These colours mixed make white light.
- The 7 component colours of white light each have different wavelength.
- Red light has a bigger wavelength so refracts the least as it passes through the prism. The ray of light refracted (bends) the least.
- Violet light has the smallest wavelength so refracts the most as its passes through the prism. The ray of light refracts (bends) the most.
- When light (one of the spectrum of waves) hits a material. The colour we see depends on the absorption and reflection of light waves. E.g. The red apple reflects red light into the eye. So, it appears red. All other colours are absorbed.
- Objects appear white if they reflect all wavelengths of light into the eye.
- Objects appear black if they absorb all wavelengths of light into the eye.

Lesson 6 – The Eye

Key Terms

Photosensitive - Materials that can detect light



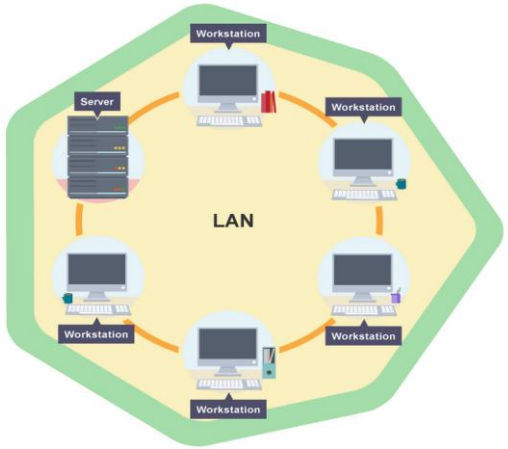
- **Cornea** - Protects the eye and focuses light onto the lens
- **Lens (convex)** - Focuses light on the retina using refraction
- **Retina** - Contains photosensitive cells called rods and cones. The cones detect red, blue and green light waves.
- **Optic nerve** - Converts light waves into electrical signals. These signals are sent to the brain which organises the information.
- The image first formed in the eye is inverted.

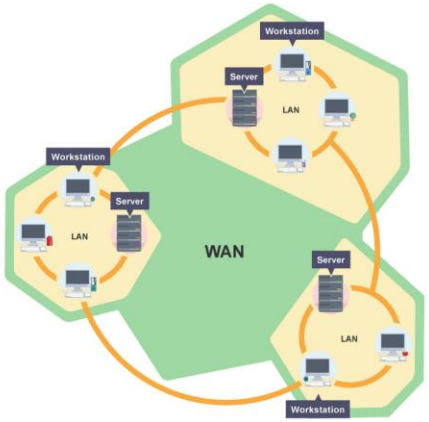
Year 9 Computing – Networking

Network
A collection of computers connected together.
LAN
Network over a local geographical area (eg School)
LAN has its own infrastructure of cabling and network hardware due to distance and practicalities
WAN
Network over a large geographical area (eg WWW)
WAN uses external hardware and external infrastructure e.g. use of satellite, phone lines or The Internet.
Advantages
- Share Internet Connection
- Share Peripherals
- Share files
- Sends Emails

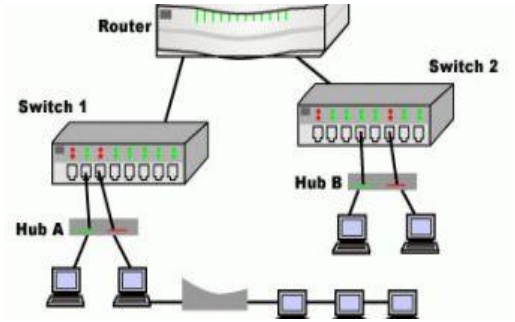


Dis-Advantages
- Risks of Viruses and Hacking
- Expensive Hardware
- Specialist staff often needed (eg Network Manager)





Possible Careers
- Network Manager
- IT technician
- Security Engineer
- Teaching

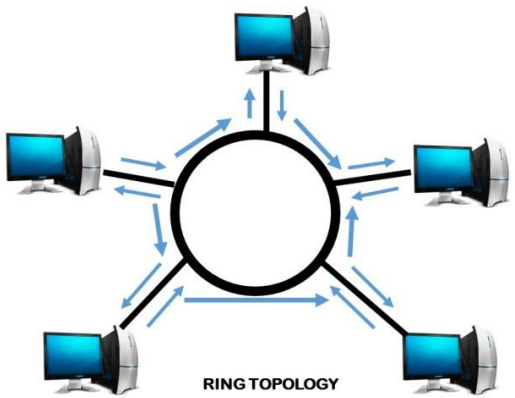


Hardware

Hub
used to connect multiple devices to the network. Now obsolete (use Switch)
Switch
connecting computers and other network capable devices together to form a network.
NIC (Network Interface Card/controller)
Internal hardware allows a device to be connected to a network. Use for wired and wireless networks
Transmission Media – What is used to transmit data across a network –.
Wired - Ethernet cable (CAT 5e and CAT 6 twisted pair). A networking standard. Coaxial cable , an older standard or Fibre optic very fast but more expensive.
Wireless
Radio and microwaves to transmit data e.g. Wi-Fi is the standard for for networks – uses two radio frequencies 2.4ghz and 5 ghz
Wireless Access Points
for wireless networks – allows devices to connect to a network wirelessly
Server
A computer that holds data to be shared with other computers. A web server stores and shares websites. Servers require server software.
Router
Connects Server to Internet and transmits data (as packets) between networks

Year 9 Computing – Networking

Topology
The layout of a network

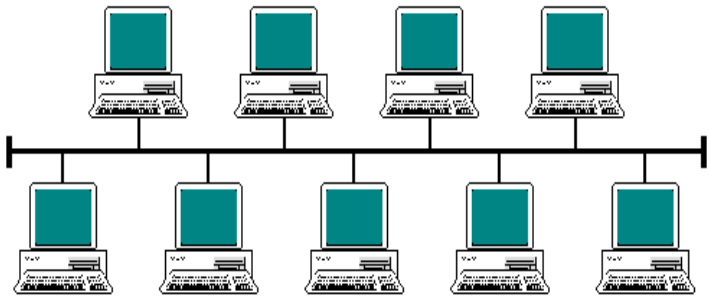


In a ring network each device is connected to two other devices, this forms a ring for the signals to travel around.

Each packet of data on the network travels in one direction and each device receives each packet in turn until the destination device receives it.

Bus topology uses one main cable to which all nodes are directly **connected**.

The main cable acts as a backbone for the network.



Remember: these can be good or not so good factors

Factors that affect the performance of Networks

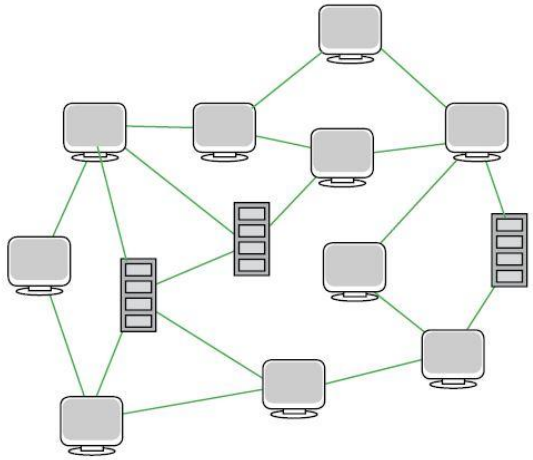
Bandwidth – the amount of data that can be transferred over a given time. **Greater bandwidth = better network can perform.**

If more people are using bandwidth on a network this can cause congestion and slow the network down.
How to solve: You could limit the bandwidth available to different users on the network address

Wired Connections – generally faster and more reliable than wireless
Fibre optic cables = better performance than copper cables
Wireless performances depends of signal quality – Physical objects such as thick walls and interference from other devices can affect the network
Choice of hardware and network topology can also have an affect on the performance

Year 9 Computing – Networking

Topology
The layout of a network

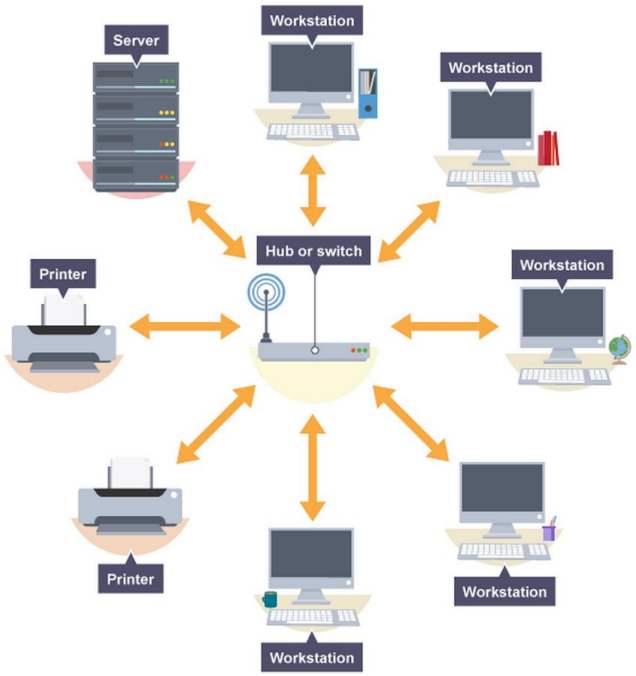


Mesh

Relatively new topology

Decentralised - Where some or all of the workstations or other devices are connected directly to each of other. Most are usually connected to the node that they exchange the most data with.

Advantage
No single point where it can fail
If one device fails then the data is sent along a different route to its target
Disadvantage
Very expensive – a lot of wire is needed to connect devices together BUT can overcome this by using wireless technology
down.



Star

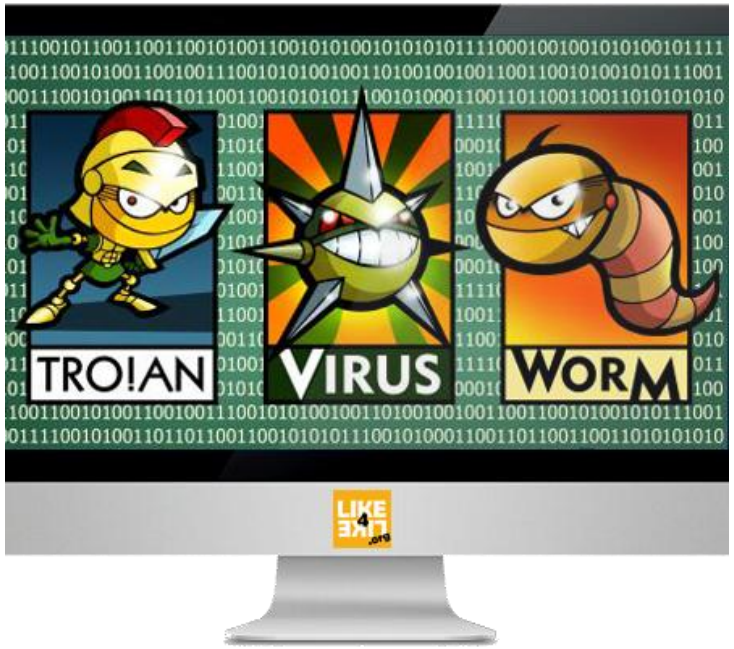
Each device on the network has its own cable that connects to a **switch** or server. It is centralised.
Central switch or server allows many devices to be connected to it

Advantage
very reliable – if one cable or device fails, then all the others will continue to work
high performing as no data collisions can occur
Simple to add more devices to network
Better performance – all data sent to central device so all devices can transmit data at once
Disadvantage
expensive to install as this type of network uses the most cable, and network cable is expensive
if a hub or switch fails, all the devices connected to it will have no network connection

Year 9 Computing – Networking

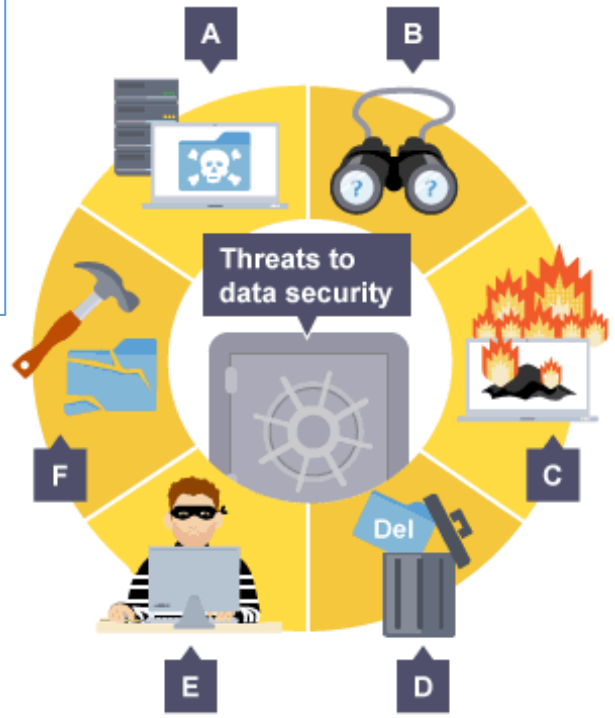
- **People as the weak point in secure systems**

- **Social engineering** - is a way of gaining sensitive info or illegal access to networks by influencing people, usually employees of large companies
- **Phishing** – another type of social engineering – criminals send emails or texts to people pretending to be well known business. They request uses update their details , when users do this the criminals use the details on the users account e.g. bank details



Possible Careers

- White hacker
- MI5 (GCHQ)
- Security Engineer
- Teaching



Key

A	Corrupted	D	Deleted
B	Lost	E	Hacked
C	Destroyed	F	Damaged

Network security threats

Malware – Malicious software installed on someone's device without their knowledge or consent.

Typical actions of malware:

Delete/modify files
Scareware – tells user PC is infected with lots of viruses – to pay for problem to be fixed
Locking files – ransomware – pay to get files back
Spyware – secretly monitors actions and sends info to hacker
Rootkits - alter permissions given hackers admin level access to devices
Backdoor – holes in someone's security leaving them open to future attacks

Malware can access your device in different ways

Viruses – in attachments, or .exe files activated when opened
Worms – self replicating viruses - spread quickly
Trojans – malware disguised as legitimate software users install them not realizing they have hidden purpose

Year 9 Computing – Augmented Reality

What is it?



Augmented reality - is a new technology where companies have developed software on a higher scale than ever for mobile phones and proprietary devices



With the latest developments in augmented reality the technology is used in shopping apps such as Argos, IKEA or Nike allowing customers to see products before they purchase them.

What does **reality** mean? Natural, Real

Examples of uses –

- Navigation systems use AR to superimpose routes on a live view of a road
- Military fighter pilots see an AR projection of their height, speed and other data on their helmet
- Neurosurgeons use AR projection of a 3D brain to assist them in performing surgery

AR = the overlay of computer-generated inputs onto a real-world environment

What do we mean by real world?
Our environment
Our planet



e ?

Technology:

- Overlay of computer generated inputs
  - Text
  - Graphics
  - Photographs
  - Audio
  - video

AR vs VR

Almost anyone with a smart phone can access AR. Augmented reality merely adds to a user's real-life experience. VR (Virtual reality) produces a computer-generated simulation of an alternate world. AR uses real world settings while VR is completely virtual.

Keywords	Definition
Augment	To enhance or alter and make more effective
Aesthetics	principles concerned with the nature and appreciation of beauty
Prototype	a first or initial version of a product
Interactive	allowing a two-way flow of information between a computer and a computer-user; responding to a user's input.
Real-world	The real environment as apposed to the simulated or imaginary world
Computer generated	a sound or visual that has been created in whole or in part with the aid of computer software or hardware
Virtual reality	the computer-generated simulation of a 3D image or environment that can be interacted with in a seemingly real or physical way by a person using device

Year 9 Computing – Augmented Reality

What does augment mean?
- enhance
- alter
- make more effective.

What does real-world environment mean?
- our surroundings
- our planet
- our world.

What does reality mean?
- natural
- real.

The sectors where AR can be used in
- architecture
- education
- entertainment
- retail
- lifestyle.

The uses of AR:
- training
- virtual tours
- marketing
- visualisation of designs, interiors, and concepts



What is AR and what is its purpose?

- Technology:
  - overlay of computer-generated inputs:
    - text
    - graphics
    - photographs
    - audio
    - video.



Forms of reality

- Augmented reality:
  - the overlaying of computer-generated inputs onto a real-world environment.
- Mixed reality:
  - the interaction of computer-generated inputs with physical objects in the real-world environment.
- Extended reality:
  - a term used for all forms of real and virtual environments.
- Virtual reality:
  - a computer-generated simulated environment.

Year 9 Computing – Augmented Reality

Types of AR

Types of AR:

- object recognition/marker-based
- location-based/markerless
- superimposed (sometimes referred to as superimposition).

Types of augmented reality applications



Consideration when Designing Types of AR

- Questions to ask:
  - What content do we want to display on the live camera view?
  - Where should we place the content within the user's view?
- Answers dependent on:
  - AR software application being used – each require different user interaction.

Markerless

- More versatile than marker-based.
- More adaptable to a wider variety of functions/activities.
- The user decides where to place virtual object.
- It relies on device's hardware to gather information.
- An accelerometer detects the orientation of a smart device.
- A digital compass:
  - is a sensor that finds direction
  - uses Earth's magnetic fields
  - always finds North.
- GPS (global positioning system) uses satellites to establish the location of an object.

Object recognition/marker-based

This is the use of specifically designed markers to trigger augmented experience.

- Markers:
  - visual prompts
  - trigger virtual object/information
  - created using distinct patterns
  - act as anchors.
- Triggers:
  - activate AR experience.
- Anchors:
  - objects recognised by AR software.

Superimposed

- Uses object recognition.
- Replaces original image partially or fully.
- Used a lot in healthcare sector e.g. to superimpose x-ray onto patient's body.

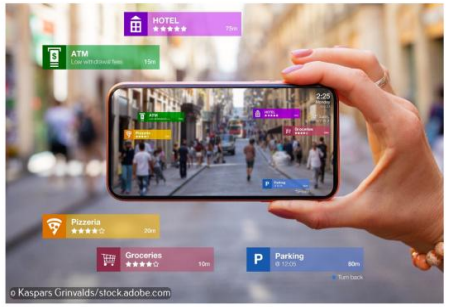


Markerless



Location-based

- Digital content tied to specific location.
- Often used for navigation.



Year 9 Computing – Augmented Reality

Types of user interaction/layers

- static
- interactive.

Types of user interaction

- User interaction:
  - reflects the real user experience after an interaction with the user interface
  - experiences are generated by the user.
- Design consideration:
  - think about how the user is going to interact with the AR app
  - depends on the devices they are going to use.

Layers

- Layers contain information and/or objects laid on top the real world viewed by the user.
- Static:
  - digital content such as text, 3D models and visual cues
  - appearance does not change during user interaction
  - no display of continuous movement.
- Interactive:
  - digital content such as animation and videos
  - changes appearance during user interaction
  - changes continuously with time
  - displays flow of continuous movement.

User interaction for AR headsets

- Types of interaction:
  - gaze
  - hand gestures.
- Gaze:
  - gaze-based navigation
  - tracks where the user is looking
  - targets items in the environment.
- Hand gestures:
  - hand gestures used to interact with targeted item.

User interaction for AR headsets

- Important considerations:
  - user's hands must remain in the viewing area of the headset
  - will not function correctly if user's hands out of view of headset
  - user's should be notified if hands reach the boundaries of headset view
  - design must use hand gestures accepted by the headset
  - keep interactions simple.

AR headset



Video © Gorodenkoff/Shutterstock

User interaction for mobile devices

- Type of interaction:
  - hand gestures by touching the screen
  - interaction occurs in 3D (real-world) space.
- Hand gestures are based on touching the screen:
  - swipe
  - pinch
  - tap
  - rotate.
- Important considerations:
  - interactions should be kept simple
  - user should receive feedback when placing or interacting with an object.

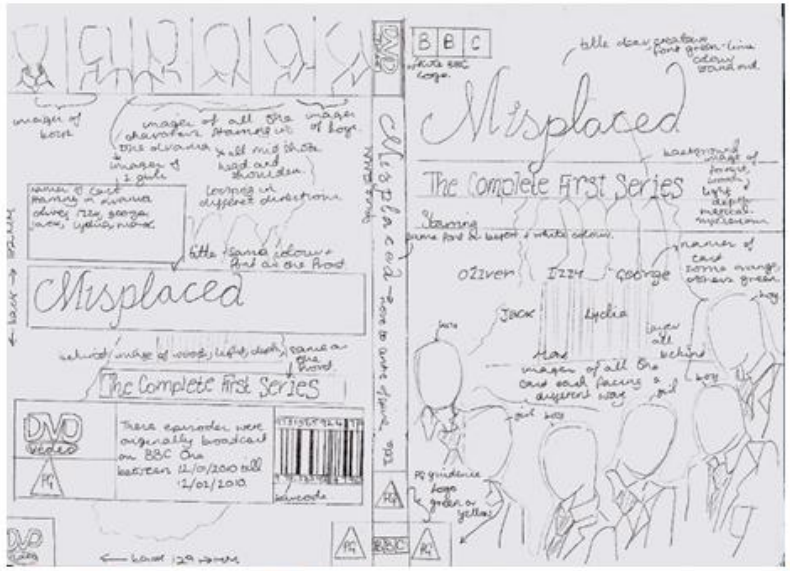
Voice interaction

- Type of interaction:
  - voice control.
- Voice control considerations:
  - Commands should be kept simple and concise.
  - Commands must be able to be stopped, reversed, undone.
  - Do not use similar sounding commands.
  - Do not use commands that are pre-set system commands.

Voice interaction

- Additional important considerations:
  - User should receive feedback as with any other form of interaction.
  - Consider that users can have different dialects and access.
  - Test with different people.
  - Give the user prompts to use a command.

You must be able to understand the purpose and use the content of different pre-production documents





Visualisation Diagrams

Visualisation diagrams are a rough drawing or sketch of what the final static image product is intended to look like. They will have annotations to describe the design ideas. Typically, a visualisation diagram is hand drawn, but it does not need any artistic skills to communicate ideas.

It is intended to demonstrate the layout and content of the product that is being illustrated

You might produce several drafts to demonstrate ideas to your client. Your client might choose the draft they like the most. There must be sufficient information in the visualisation diagram for the client to make a decision about their preferred design.

Visualisation diagrams are valid for static designs, that is an image that does not move. It is, therefore, relevant for designs such as a magazine cover, a DVD cover, or an image for a website. It would not be suitable for a video or an animation.

Look closely at the detail in the example visualisation diagram. Compare the concepts in the visualisation diagram and compare them to the final product that was produced. Do you notice the similarities and the differences.

Notice how the visualisation diagram was not modified as ideas developed in the pro-

Purpose:

⇒ Plan the layout of a static or still image in a visual manner

⇒ To show how a finished item might look like

Uses :

⇒ CD/DVD cover design

⇒ Poster, such as for a film, event, leaflet or advertisement

⇒ A single game scene of display of a single scene

⇒ Comic book page layout

⇒ Web page layout

⇒ Magazine front cover

Content:

⇒ Multiple images, layout and positions of items.

⇒ Colours and colour schemes

⇒ Position and styles of text

⇒ Fonts, font colours and size

⇒ Notes as annotations which provide

Year 9 Computing – Python Expert

Analyse
- Inputs, Outputs, Processing
- Programming Techniques

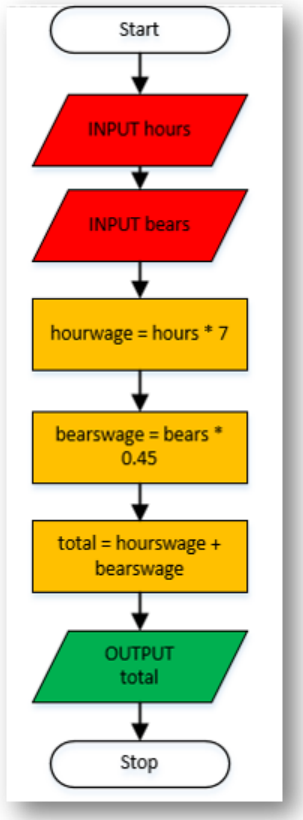
Design
- Flow Chart
- Pseudo Code

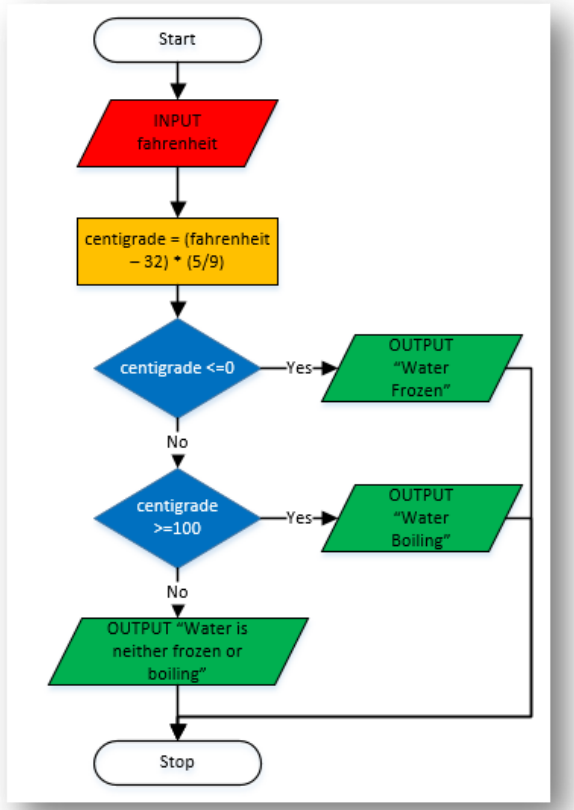
Develop
- Python Code
- Development Diary

Testing
- Testing Table

Evaluate
- Evaluation
- Code
- Bibliography

- **Inputs** (things user types in)
- **Processes/Calculations** (what the program works out)
- **Outputs** (what gets printed out)
- **Decisions** (what options or choices can the user/program make)





Year 9 Computing – Python Expert

Maintainable code: Code that is written in a way that can be easily maintained/edited be the author or other developers. Ways to do this are:

- Meaningful **variable names**
- Detailed code **comments**
- **Well laid out** code, grouped in sections
- Consistent use of **indentation**

Robust code: Code that is written in a way that makes it much harder for the user to crash/break the code. Ways to do this are:

- Clear **user instructions**
- Input **validation**
- User **logins**

Efficient code: This is where you try to make the code as efficient as possible using these guidelines:

- Code **isn't repeated** unnecessarily
- Make use of **subroutines**
- Use a **range of programming techniques**

Normal data - sensible, valid **data** that the program should accept and be able to process.

Boundary data - valid **data** that falls at the **boundary** of any possible **ranges**.

Erroneous data - invalid **data** that the program cannot process and should not accept.

Test tables are used to provide a structure to **testing**. Programmers will often create a **table** with a selection of normal, extreme and exceptional data that they intend to **use** during **testing**.

Test	What am I testing?	What data will I use?	Normal/ Boundary/ Erroneous?	Expected result	What happened?	Any changes ?
1	*the user has to enter their name*	*"Adam"*	*Normal*	*it asks the user "username:"*	*It worked*	*no*
2	*randomly picks the film*	-	*Normal*	*Three random films appear*	*It only showed 2*	*Check random loop*

Year 9 Computing – Python Expert

Variables

- Variables are for storing values in memory.
- A variable is declared (set up) and values are assigned.
- Variables are assigned a value using the = operator.
- It chooses the bets data type for the value.
- No spaces in names but can use under_score or camelCase.
- No numbers at start of variable names.

```
myvariable = 28

x = 3

name = "Bob"

my_wage = 3.5

favCol = "red"
```

Comments

- Comments are for explaining lines of code or while sections.

```
x = 3  #can comment at the side

#or comment above
house = "open"
```

Print

- Print information to the screen.
- Can be text, numbers or values in variables.

```
print("hello world")

print(12)

print(name)
```

Input

- Allows user to type in data and store in a variable.
- User prompt requires the " ".
- May need to convert data type.

```
variable = input("message")

name = input("please enter your name")

age = int(input("please enter your age"))
```

Data Types

Real /Float
Number with decimal Point

Integer
Number without a decimal Point

String
A series of characters/TEXT

Character
A single letter or symbol

Date/Time
Date and Time in any format

Boolean
Yes no, true false value

Comparative Operators

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

Year 9 Computing – Python Expert

If and elseif statement

- **Allows SELECTION of different paths.**
- **Use of THEN & ENDIF.**
- **MUST include indent of 4 spaces or TAB**
- **ELSE is optional.**

- **Conditions are set using different comparison operators.**

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

- **Can use more than 1 condition using Boolean operators.**

AND	Both conditions are True
OR	Either of the conditions is True
NOT	If condition not True

- **Use of ELSEIF allows for further selection.**
- **Can have as many as wanted.**
- **ELSE still optional.**

```
if password ==  "pa55word1":
    print("you may enter")
```

```
if score > 80:
    print ("grade A")
elif score > 70:
    print ("grade B")
elif score > 60:
    print ("grade C")
else:
    print ("redo")
```

```
if password !=  "password1" or tries < 3:
    print("you shall not pass")
else:
    print ("please enter")
```

Careers

- Software development
- Programing
- Software Engineering

Sequence: Completing steps in the order which they must happen

Selection: Where a choice is made in a program depending on a condition or outcome

Iteration: Act of repeating or lopping specific sections of code

Count controlled Iteration: Repeats a set number of times

Condition controlled Iteration: Repeats until a condition is met or something in the program changes

Year 9 Computing – Python Expert

While Loop

Will keep asking the user to type in a value.

```
#--while loop--
password = input("enter password:")

while password !=  "password1":
    password = input("try again")
```

While True (Break)

If the user types in a value that matches 7 the loop will break (end), if not they will be told to try again.

```
#--while True with break--
while True:
    guess = input("guess the number")
    if guess == "7":
        break
    else:
        print ("try again")
```

For Loop

Start at 0 and stop at 7 (up to 7 but not including), print hello each time (7 times).

```
#--for loop--
for i in range(0,7):
    print ("hello world")
```

For Loop (Break)

Start at 0 and stop at 4,
If the user types in a value that matches mypassword the loop will break (end), if not they will be told to try again and have an attempt recorded.

```
#--for with break--
for i in range(0, 4):
    if password  == "password1":
        break
    else:
        password = input("enter password")
```

- Loops are a way for python to do blocks of code more than once
- Without having to keep copying the code
- Blocks of code being repeatedly run is called **iteration**
- Python offers two ways of looping
  - **while** loop
  - **for** loop

Year 9 Computing – Python Expert

Empty list of 0 spaces.

Arrays with values. Use the , to split up space.

Can be different data types, strings need " ".

```
#--format--
mylist = [ ]

group = ["Tim", "Jane", "Bob"]

ages = [14,11,17,10.5,"Apple",True,False]
```

Print whole array.
Print 1st value in array.
Print 3rd value in array.
Prints from 1st value to 2nd value.

```
#--print--
print(group)
print(group[0])
print(group[2])
print(group[0:2])
```

Update a value to position 3 in array.

Update a value to position 0(start) in array.

```
#--update value--
group[2] = "Mike"

group[0] = "Destiny "
```

Add value to end of array.

Remove first instance of value from array.

Insert a value to a specific position in the array

```
#--adding/remove/insert--
group.append("Fred")

group.remove("Jane")

group.insert(2,"Miya")
```

- An array is like a variable that can hold more than 1 value at once
- Must all be the same data type
- Array can be as big as you want
- Sometimes called lists
- Will need a name/identify
- The index, are the position number
- Always starts at 0
- The spaces are called the elements
- These hold the values/items

Year 9 – Geography – Misrepresented Places - Africa

Africa is a continent

The African continent has a land area of 30 million sq km.

Africa is home to 54 countries all with their own culture, traditions, level of development and biodiversity.

The continent of Africa experiences a range of different climates due to its size. In the north it is an arid and hot climate (along the tropics). Along the equator it is warm and wet.

Africa representation

Representations of place come in many forms: from social media platforms, TV programmes, films, adverts, or even music. All these cultural forms influence how we may think and feel about different places.

There are two sides to the story of the song 'Do they know it's Christmas'. On one hand, the song raised over 10 million for charity.

On the other hand, it creates many misconceptions about the continent of Africa. For example, the phrase 'no rain nor rivers flow' despite the world's largest river running through the continent.

The book 'Africa is not a country' discusses this song in more depth.

Africa's resources

Africa has a large quantity of natural resources, including oil (a fossil fuel), gold (a metal), salt (a mineral) and cocoa beans (food).

Recently discovered oil reserves have increased the importance of the commodity on African economies.

Ghana is the continent's largest producer of gold, followed by South Africa and Mali.

The abundance of natural resources in Africa have helped many countries develop.

However, natural resources are not always a blessing and can create vulnerabilities. Poor governance, trans-boundary dynamics and competition over scarce resources can all create conflict for Africa.

The exploitation of oil is also causing environmental damage.

China in Africa

China's growing population increases the demand for resources and therefore China are investing in Africa countries for resources.

Chinese FDI mostly pays from improving infrastructure in Africa, such as better transport links and technology.

China is heavily investing in countries such as Algeria, Egypt and Angola which are oil rich.

Chinese investment can be argued to have been both successful and unsuccessful. Some countries, such as the Democratic Republic of Congo, have been left in debt.

Keyword	Definition
Borders	A line separating two countries. This can be natural or human created.
Commodity	A raw material or primary agricultural product that can be bought and sold, such as copper or coffee.
Development	The process of something evolving and changing to improve.
Foreign direct investment (FDI)	Foreign Direct Investment is money from large international companies being invested in a country.
Industrialisation	The development of industry in a country or region
Infrastructure	Basic physical structures such as buildings, roads, power supplies, transport links.
Mercator projection	A common map projection that fits all countries on the map by 'shrinking' countries al the equator.
Natural resources	Materials or substances that occur in nature which can be exploited for economic gain.
Permafrost	A thick layer of soil below the surface which remains frozen all year round.
Representation	The description or portrayal of someone or something.
Sanctions	A penalty imposed by one country on another to stop it acting aggressively or breaking international law.
Tundra	A vast, flat, treeless Arctic region of Europe, Asia, and North America in which the ground is permanently frozen.
Vulnerabilities	The state of being exposed to the possibility of being attacked or harmed.

Year 9 – Geography – Misrepresented Places – Africa and Russia

Africa case study - Nigeria

The population of Nigeria is 206.1 million and this is growing by 2,5% per year.

The life expectancy is 54.6 years.

The gross domestic product per capita (GDP per person) is $2,160.

However, the country experiences high inequality, income of Nigeria's top five richest men could end poverty at a national level, yet 5 million people face hunger in the country.

Russia's physical geography

Russia, the largest country in the world, occupies one-tenth of all the land on Earth.

It spans 11 time zones across two continents (Europe and Asia) and has coasts on three oceans (the Atlantic, Pacific, and Arctic).

Russia's climate has warm dry summers and cold winters with temperatures of -30°C and sometimes heavy snowfall.

Siberia in northern Russia is dominated by a huge boreal forest which stretches the entire length of the Arctic circle.

Russia's resources

Russia is a major producer of copper, gold and lead.

Russia holds the world's largest natural gas reserves, the second largest coal reserves and the eight largest oil reserves.

Crude oil accounts for $123 billion of its export revenues.

The recurrent problem with extraction of natural resources is that they are almost always situated in inaccessible places. This is due to the size of Russia and its cold climate.

Russia has vast oil reserves in the Arctic but cannot exploit them. This is a self-imposed restriction as companies do not have the experience or technology for the country to benefit from these resources.

Russia and conflict

In the past 500 years, Russia has been invaded several times from the west.

Russia has repeated attempts to occupy Poland throughout history. The country has a narrow corridor into which Russia could drive its armed forces to block an enemy advance toward its own border, which, being wider, is much harder to defend.

The physical geography of Russia provides the country with natural protection, for example long borders (the border between China and Russia is 4,300 km), mountainous borders (Caucasus between Russia and its border with Iran and Turkey), and freezing climates (temperatures in Siberia can read -60 degrees Celsius).

Russia and Ukraine

There has been tension between Ukraine and Russia for centuries.

Ukraine was part of the Soviet Union until 1991.

Experts say that Russian President Vladimir Putin has been looking for an excuse to go to war with Ukraine in an effort to rebuild the former Russian Empire.

Russia's military is eight times the size of Ukraine's.

Sanctions have been given to Russia due to the attacks. These include an import ban on Russian gold, a ban on the export of luxury goods to Russia and the UK has imposed a 35% tax on some imports.

Russia's economy has been impacted by the sanctions. Car sales have fell by 83.5% and GDP is predicted to fall by 30%.

Abandoned Russia

The collapse of the Soviet Union later led to many abandoned villages.

Unemployment and poor living conditions forced people out of the village and led them to migrate toward the cities.

In northern Russia, there are hundreds of abandoned settlements and ruined factories.

Many villages are home to primarily pensioners and many others have less than 10 residents.

Year 9 – Geography – Dark Tourism

Dark Tourism

Dark tourism refers to visiting places where some of the darkest events of human history. This includes genocide, war and disasters. Popular television shows have introduced this tourism to more people.



There is controversy surrounding dark tourism. There is a lot to consider when it comes to visiting these places as they are sites of human suffering.

Some argue that human suffering is being exploited for economic gain.



However, it is important to consider where this money goes as in most cases it goes toward maintenance, preservation and education. Without dark tourism many sites would eventually disappear.

Some see the locations as a space, something abstract and measurable, such as the location on a map. Some see the locations of tragedy as a place, a location with cultural meanings and human connections.



Natural disasters

Pompeii

Pompeii is a vast site in southern Italy that has been preserved for visitors to explore the ruins of the Mount Vesuvius eruption in 79 A.D.



The eruption is one of the deadliest in European history. The eruption killed 2,000 in Pompeii and up to 16,000 lost their lives in the wider area.



The main cause of death was pyroclastic flows, an extremely hot and fast flowing mass of ash, toxic gas and debris that burnt people alive. Pompeii shows the remains of these people that have been preserved as plaster casts.

One third of this site is unexcavated meaning damage to the area is minimal.



There are replica body casts at the site of Pompeii, this creates human connection with the site.

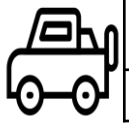
Mount Merapi

Many people visit Indonesia each year to see the villages that have been destroyed by Mount Merapi eruptions. Particularly the eruption in 2010 that thirteen years on villagers still talk about.



The volcano spewed 140 million cubic metres of rock and ash, destroying three communities, and a series of eruptions killed 353 people, with more than 61,000 evacuated. More than 3,000 buildings were damaged.

Tourism here is very important to the local and national economy. It helps people rebuild their lives following disasters. To many visitors the volcano is a space to visit, to locals it is a place where they must accept many risks and has caused devastation.



Keyword	Definition
Avalanche	A mass of snow, ice, and rocks falling rapidly down a mountainside.
Concentration camp	A place where large numbers of people are deliberately imprisoned in a relatively small area with inadequate facilities to provide forced labour.
Controversy	A prolonged disagreement.
Crevasse	A deep crack in a glacier or ice sheet.
D-Day	The D in D-Day stands for Day. It is a code used for the day of any important invasion or military operation.
Disaster	An event that results in loss of life.
Economic	Something specifically relating to money.
Eddy	A circular current.
Excavated	Dug up.
Extermination camp	A camp with the sole purpose of murder.
Incarcerated	Imprisoned.
Nuclear	Energy released during fission or fusion.
Place	A location that has cultural meanings and human connections.
Preserved	Maintain in its original or existing state,
Pyroclastic flow	A dense destructive mass of very hot ash, lava and gas that is ejected explosively from a volcano.
Radioactive	Emitting or relating to the emission of ionizing radiation.
Space	A location that is measurable, such as where it is on a map.
Summit	The highest point of a hill or mountain.
Tourism	The commercial organisation and operation of holidays and visits to places of interest.
Upwelling	The upward motion of water.

Year 9 – Geography – Dark Tourism

Conflict

Normandy

Many people associate Normandy with the setting for D-Day in 1944.



Each year there are over 5 million visitors to the sites and museums devoted to D-Day and the Battle of Normandy.



Many people see Normandy as a place with historic meaning, while others visit this space in France for its stunning beaches.

Since 2019, Normandy Tourism and the Normandy region are committed to tourism being sustainable, specifically by encouraging use of the train, bikes and footpaths. Normandy have had to do this due to large tourist numbers contributing significantly to France's carbon footprint.



Auschwitz

Geography impacted where concentration camps were located. They could only go in locations of Nazi German control and extermination camps were outside of Germany.



Each year 2.3 million people visit Auschwitz Birkenau. 11% of the tourists that go to Poland visit Auschwitz, some argue that we should not give money to an industry that makes money from human suffering. However, the Auschwitz-Birkenau foundation is a non-governmental and non-profit organisation.



The house of commandant Rudolf Hoess has been lived in by later generations. These generations have seen the site as a space.

Prisons

Alcatraz

Alcatraz Island is a small island 1.25 miles offshore from San Francisco, California, United States.



In 1934, the island was converted into a federal prison. The strong currents around the island and cold-water temperatures (10 degrees Celsius) due to upwelling made escape nearly impossible. The area also has an eddy that would be difficult to swim through and 11 species of shark.



Alcatraz closed after 29 years of operation in 1963 because it was too expensive to continue running. The island now has prison tours for people to see and attracts 1.5 million each visitors per year.



Nuclear Disasters

Chernobyl

In 1986 a routine 2—second shut down of the system seemed to be another test of electrical equipment but seven seconds later, a surge created a chemical explosion that released who amounts of radiation into the atmosphere.



Residents were given two hours to gather their belongings before evacuation began. Approximately 350,000 people were evacuated as a result of the accident and a radiation zone is still in place today. Many predict it will be up to 3,000 years before the area is safe for residency.



In 2021 nearly 73.1 thousand tourists visited the Chernobyl Exclusion Zone in Ukraine in 2021.



Fukushima

The Fukushima nuclear power disaster was triggered by an earthquake in Japan. The earthquake caused a 15-metre-high tsunami wave that hit the nuclear power plant.



Over 100,000 people were evacuated because of this event. Each year over 50,000 people visit the area.

Deadly tourism

Mount Everest

Mount Everest us Earth's highest mountain above sea level,. The China-Nepal border runs across its summit point.





Over 310 people have died trying to reach the summit of Mount Everest.

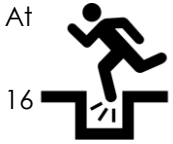
Until the beginning of the 21st century, mountaineering was an exclusive activity accessible only to a few. Twenty years later, despite being a high-risk activity that requires a high level of specialised skill, its popularity among recreational climbers has drastically increased.



The recent trend can be explained by the shift to commercial guided-tour industry which is capitalising on better accessibility to big mountains, affordable transportation and more advanced equipment.



In 2015, a 7.8 magnitude earthquake struck Nepal and the surrounding countries. The shaking triggered an avalanche into the base camp on Mount Everest. At least 22 people were killed.



In 2014, a chunk of the glacier came away from the mountain and killed 16 people.

Crevasses on Mount Everest are around 160 feet. People falling into these cause a lot of deaths.

Year 9 – Geography – Extreme Weather

Air Masses

Air masses are huge bodies of air that can affect the weather conditions of a place.



There are different types of air masses:

Polar air masses come from the poles and bring cold air.



Tropical air masses come from the tropics and bring warm air.

Maritime air masses come from over the oceans and bring a wet weather.



Continental air masses come from over land and bring dry weather.



Artic air masses bring snow in the winter.

Jet streams can also influence the weather. They are a core of string winds around 5 to 7 miles above the Earth's surface, blowing from west to east.



Tornadoes

A tornado is a violently rotating column of air that is in contact with both the surface of the Earth and a cloud.



Tornadoes form where cold dry air and warm humid air collide.

Tornadoes are common in central USA (Tornado Alley) due to warm/cool air combining.



The UK has between 30 and 50 tornadoes each year – that's more tornadoes per land area than anywhere else in the world.

Stronger thunderstorms cause stronger tornadoes. These thunderstorms are known as supercells.



The Fujita Scale and the Enhanced Fujita Scale rate tornadoes by the damage caused. They are rated from F0 (not too bad) to F5 (very bad with lots of damage).



Tropical Storms

Tropical storms are extreme low-pressure systems.



For a tropical storm to form the ocean needs to be at least 27 degrees Celsius and there needs to be converging winds near the surface of the ocean.



The Coriolis effect is what causes a tropical storm to spin, for this reason tropical storms do not form along the equator.



Tropical storms can also be known as typhoons, cyclones or hurricanes, their names depends on which part of the world they have formed in.



The Saffir-Simpson Hurricane Wind Scale is a 1 to 5 rating based only on a hurricane's maximum sustained wind speed.



This scale does not take into account other potentially deadly hazards such as storm surges and flooding.





Keyword	Definition
Air mass	A large body of air that has certain characteristics e.g. polar maritime.
Arid	A dry climate that consists of hardly any rain.
Cyclone	A tropical storm that forms over the South Pacific and Indian Ocean.
Economic	Relating to money.
Environmental	Relating to the land, air or sea.
Deforestation	Cutting down trees.
Coriolis force	A 'spinning force' near the tropics that causes tropical cyclones to rotate.
Drought	A period of prolonged unusually low rainfall.
Fujita scale	A scale that measures the strength of tornadoes from F0 to F5.
Habitat	An animals home.
Hurricane	Tropical storms that form over the North Atlantic, central North Pacific, and eastern North Pacific.
Overgrazing	Too much grazing (animals eating grass) that causes damage to land.
Social	Relating directly to people.
Tornado	A violently rotating column of air.
Tropical storm	A rotating, low pressure storm system.
Typhoon	Tropical storms that form over the northwest Pacific.

Year 9 – Geography – Extreme Weather

Hurricane Harvey

Hurricane Harvey was a devastating Category 4 hurricane that impacted Texas and Louisiana in the USA in August 2017.

The hurricane caused flooding and over 100 deaths.

The preparation time for Hurricane Harvey was under 50 hours. This short window of time meant that many communities were insufficiently prepared to handle the storm when it hit.

Many hospitals reported an insufficient number of emergency shelters open and ready to take in evacuees

Cyclone Idai

Cyclone Idai has been one of the worst tropical cyclones on record to affect Africa and the Southern Hemisphere.

The storm caused a humanitarian crisis in Mozambique, Zimbabwe and Malawi, leaving more than 1,500 people dead and many more missing.

As these are developing countries they do not have a lot of money to prepare for events such as Cyclone Idai and rely on aid to help them rebuild their country and continue to develop.

The UN appealed for donations of $282 million to fund emergency



Forest Fires

Forest fires are a natural and necessary part of a forest ecosystem.

Healthy forests contain decaying organisms and fires return the nutrients to the soil. They also kill insects and diseases that damage forests.

Forest fires can also lead to loss of life, health issues, damage property and biodiversity loss.

Eastern Australia is one of the most fire-prone regions of the world, and its predominant eucalyptus forests have evolved to thrive on forest fires.

Forest fires in Australia are known as bushfires.

The 2009 Black Saturday bushfires were the worst in Australia's history, killing 173 people. Almost 80 communities and entire towns were left unrecognisable.

Australia is well organised and well-resourced to respond to forest fires, but the scale and impact is often unprecedented.

To prevent forest fires existing fire infrastructure needs to be maintained, roadside weed control and routine burns can all take place.

Evacuations should also take place to avoid loss of life.



Drought

Droughts are periods of time with below-average amounts of precipitation.

Droughts can occur in any region of the world. Today, droughts in the US are concentrated in the west part of the country. States like California, Nevada, Utah and Arizona are experiencing unprecedented heat and dry weather.

There are both physical and human causes of drought including a lack of precipitation (hydrological) and using too much water

Sahel

Originally it was believed that the drought in the Sahel was primarily caused by humans over-using natural resources in the region through overgrazing, deforestation, and poor land management.

In the late 1990's, climate model studies suggested that large scale climate changes were also triggers for the drought. These droughts often cause famines.

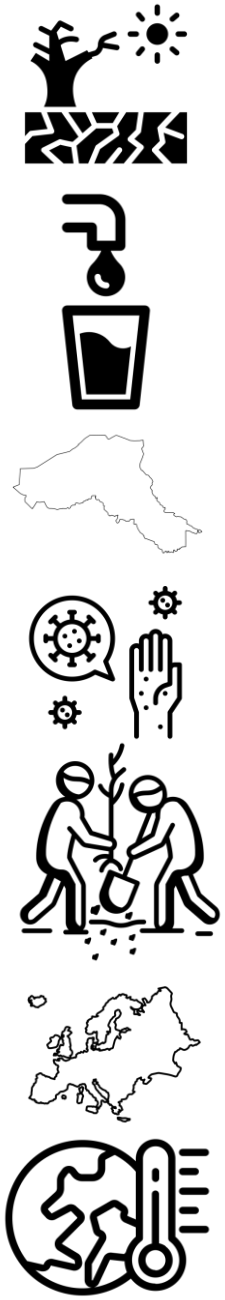
The Sahel is a developing region that relies on agricultural activities for much of its income, this means that droughts have huge impacts on life, the economy and development.

Europe

During the summer of 2022, parts of Europe experienced drought conditions which were made worse by heat waves.

The drought had profound consequences for hydropower generation and cooling systems for nuclear power plants. Agriculture was also negatively affected.

Droughts in Europe could become the norm by 2050 due to climate change.



Key word	Definition
Treaty of Versailles	Treaty with conditions that ended the state of war between Germany and the Allied Powers after WW1
Nazi	A member of the National Socialist German Workers' Party.
Evacuation	The action of fleeing a place under attack
Blitzkrieg	Attacking from the air and on the land powerfully with modern military technology for a quick defeat of enemies on the battlefield
Appeasement	A diplomatic policy, to avoid conflict, with an aggressive power by giving the power what they want.
Armistice	An agreement made by opposing sides in a war to stop fighting for a certain time; a truce.
Home front	The civilian population and activities of a nation whose armed forces are engaged in war abroad.
Atomic bomb	A bomb which derives its destructive power from the rapid release of nuclear energy, causing damage through heat, blast, and radioactivity.
Aryan Race	A concept in Nazi racial ideology of the ideal German person – a superior race of people.
Luftwaffe	German term for an air force
Munition	Military weapons, ammunition, equipment, and stores.
V.E Day	The day (8 May) marking the Allied victory in Europe in 1945.

Year 9 – History – Why was there another World War?

ORMISTON SWB ACADEMY

How did World War Two start?

World War Two began in September 1939 after the invasion of Poland by Germany and the Soviet Union. However, there were multiple causes of World War Two, both long term and short term. Arguably the most significant cause of WWII was the Treaty of Versailles and the impact it had on Germany. There were two alliances during World War Two, the Allied Powers and the Axis Powers. Britain was part of the Allied powers and Germany were part of the Axis powers.

How did warfare change from WWI to WW2?

Warfare changed dramatically in World War Two compared to World War One. In WW1, fighting was dominated by trench warfare, where armies were stuck in long lines with little movement. However, WW2 saw the use of Blitzkrieg (lightning war) tactics. Other areas of warfare, such as technology, mobility and communications also changed drastically since WW1. Overall, the tactics used in WW2 were much more effective, however warfare began to involve civilians much more with the bombing of cities.

How were people in Britain impacted by the Blitz?

Between 1940 and 1941, during the Blitz, German bombers attacked cities across Britain in an effort to destroy industry and break civilian morale. London was bombed for 57 nights in a row and many cities were also badly hit. Thousands of civilians were killed, homes were destroyed, and daily life was turned upside down. People took shelter in underground stations or air raid shelters in their gardens, while children were evacuated to the countryside to keep them safe. Families were torn apart, people lived in fear, and some areas suffered badly. Children in the cities were evacuated to rural areas.

Was Dunkirk a success or a failure?

In 1940, British and French troops were forced to retreat to the beaches of Dunkirk after Germany launched an attack through France. 330,000 Allied soldiers faced capture or death. In response, Britain launched an operation to evacuate the soldiers using naval ships and hundreds of small civilian boats. Over nine days, thousands of men were rescued and brought back to Britain. Some view Dunkirk as a great success: a miraculous escape that saved the British army and boosted morale. Others see it as a failure: a chaotic retreat after a crushing defeat, with huge losses of weapons and equipment.

Why did Operation Barbarossa fail?

In 1941, Hitler launched Operation Barbarossa, sending over three million German soldiers into the Soviet Union. At first, the invasion was going well and the German army made rapid progress, taking millions of Soviet prisoners. But the operation soon ran into serious problems. The Soviet Union was huge, and the German army were running out of supplies. The Soviets used clever tactics against Germany. German troops were also not prepared for the freezing temperatures.

Why did America get involved in World War Two?

On December 7, 1941, Japan launched a surprise attack on the American naval base at Pearl Harbor in Hawaii. Hundreds of Japanese planes bombed battleships, airfields, and dockyards, killing over 2,400 people and destroying lots of the U.S ships. The attack shocked the American public and the very next day, President Roosevelt declared war on Japan. Before this point, America wanted to stay out of the war, but Pearl Harbour changed that.

Key word	Definition
Invasion	Taking control of a country or region with an armed force
Triumph	Winning something or being successful
Lebensraum	A German word meaning "Living Space" - in reference to fertile land in Eastern Europe (Poland, Baltic states, Belarus, Ukraine, Russia) - the future territory of the German Empire under the Nazi's.
Blitz	A German bombing campaign against Britain from the air
Air Raid	An attack from the air
Black Out	When windows are blocked out to hide any light
Conscription	When men were forced to join the army
Propaganda	Information, which is often false, which a political organisation publishes to make people agree with what it is saying.
Operation Barbarossa	The invasion of the USSR
Empire	A large group of states or countries ruled over by a single leader.
Communism	A political belief that everyone should be seen, a theory or system of social organisation in which all property is owned by the community and each person contributes and receives according to their ability and needs.

Year 9 – History – Why was there another World War?

Who were the soldiers of the Empire?

Just like during World War I, WW2 saw millions of soldiers from across the British Empire fight alongside British forces. These soldiers came from countries such as India, Canada, Australia, New Zealand, South Africa, the Caribbean, and parts of Africa. The largest group came from India. Over 2.5 million Indian soldiers served in the British Army, making it the biggest volunteer army in history at the time. Soldiers from the Empire fought in every major part of the war. Other examples were the soldiers from West Africa, who were often treated poorly, as well as the Gurkhas from Nepal. The contributions of the empire troops during WW2 were significant in winning the war because they provided vital manpower, resources, and support across key battles.

What was life on the Homefront like?

Life on the Home Front during World War Two was full of change, sacrifice, and uncertainty for people in Britain. Everyday life was affected by rationing. Food, clothes, and fuel were limited, and people had to use coupons and grow their own vegetables in "Dig for Victory" gardens. With many men away fighting, women took on new roles in factories, farms, and even the armed forces. Cities were targeted in bombing raids during the Blitz, so families spent nights in air raid shelters, and children were evacuated to the countryside for safety. People also faced blackouts, gas mask drills, and the constant fear of invasion. Despite these hardships, many communities pulled together, and there was a strong sense of duty and determination to support the war effort. The Home Front showed that the war wasn't just fought by soldiers, but by ordinary people doing their part every day.

Why was D-Day a turning point in World War Two?

On June 6, 1944, D-Day began; the largest seaborne invasion in history. Allied forces from Britain, the United States, Canada, and other nations landed on the beaches of Normandy in German-occupied France. After months of careful planning and deception, hundreds of thousands of soldiers stormed the beaches under heavy fire. It was a risky operation, but it succeeded in breaking through German defences. D-Day was a turning point in World War Two because it marked the start of the liberation of Europe from Nazi control. Within weeks, thousands more soldiers, tanks, and supplies had landed, and the Allies began driving the Germans back. Although the war continued for nearly another year, D-Day made Nazi defeat much more likely.

How did World War Two end?

World War Two ended in 1945 after six years of fierce fighting across the globe. In Europe, the Allies pushed German forces back from both the east and west, with Soviet troops advancing from Russia and British, American, and Canadian forces moving through Western Europe after D-Day. In April 1945, Soviet soldiers captured Berlin, and Adolf Hitler committed suicide. Germany surrendered unconditionally in May, marking the end of the war in Europe.

Why did the USA drop an atomic bomb on Japan?

In August 1945, the United States dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki. The U.S. wanted to end the war quickly and avoid an invasion of Japan, which would have resulted in huge casualties on both sides. The atomic bombs caused never seen before destruction and loss of life, forcing Japan to surrender just days later. Some argue the bombs were necessary to save lives and bring a swift end to the war, while others believe their use caused unnecessary suffering. The bombings marked the first—and so far, only—use of nuclear weapons in war, changing the course of history forever.

Key word	Definition
Anti Semitism	Acting upon prejudice attitudes or hatred towards Jews.
Aryans	Northern Europeans, including Germans, who Hitler believed were the 'Master Race'
Autarky	The idea that Germany should be economically self-sufficient
Concentration camp	Places of imprisonment where people are forced to work
Extermination camp	Death camp
Führer	The idea that there should be a single leader with complete power rather than a democracy
Genocide	The deliberate killing of a large group of people, especially those of a particular nation or ethnic group
Ghetto	An area closed off from the rest of the city – usually where minority groups are
Kristallnacht	Night of Broken Glass—attacks on Jews & Jewish property that signalled intensification of persecution of Jews in Germany
Liberation	The action of setting someone free from imprisonment, slavery, or oppression; release
Persecution	Unfair or cruel treatment over a long period of time because of race, religion, or political beliefs
Resistance	To refuse to do something
Synagogues	A building in which Jews meet for religious worship or instruction.
Final Solution	The decision made to execute the Jews
Nuremberg Laws	The laws passed in 1935 that took many legal rights away from Jews
Holocaust	The murder/mass destruction of a race
Segregation	When something is split or separated
Collaboration	Working together
Occupation	The action, state, or period of occupying or being occupied by military force.
Trade Union	A group set up to protect the rights of workers
Uprising	Violence against those in authority

Year 9 – History – What was the Holocaust?

ORMISTON SWB ACADEMY

What was life like for Jews in pre-war Europe?

Jewish communities had existed in Europe for many years. They settled in different places, and could be found in every country in Europe by the early twentieth century. Though many Jews were very religious, others were less so and some not at all. There was a great diversity of languages and cultures across Europe's Jewish communities. Jewish identity was very important to many people but not to everyone. They lived like anyone else; freely and happily. Jewish people lived normal lives and were happily married, had successful careers through their education and enjoyed leisure activities.

How did antisemitism increase under Nazism?

Hitler had negative views of the Jewish people, and when he became the Fuhrer of Germany in 1934, the persecution of the Jews increased. He was not the only person who held antisemitic views – many others also did and had done throughout history. Hitler thought the Jewish people were a race, not a religion. He passed laws to disrupt their lives and discriminate against them. For example, the Nuremberg Laws of 1935 would not allow Jews and non-Jews to get married. As time went on, more laws were introduced such as not being able to own businesses or drive, which isolated the Jewish people and took away their basic human rights.

Year 9 – History – What was the Holocaust?

How did Jewish persecution escalate from 1933-1938?

The Holocaust was the mass murder of Jews under the German Nazi regime during the period 1941–45. The Nazis also murdered millions of other people as well. There were several stages where the Nazis escalated the persecution of these people.

Kristallnacht

- This event has been considered by historians to be the start of the Holocaust. This event, in November 1938, saw the destruction of Jewish homes, businesses and synagogues.
- It means, the Night of Broken Glass.
- It was the first use of widespread violence against the Jewish people, where they were forced to go to concentration camps.

Ghettos

- 400,000 to 500,000 Jews lived in the Warsaw Ghetto.
- Walls were built to separate the ghetto district from the rest of the city
- The Nazi government wanted to stop Jews mixing with the superior Aryan race
- Starvation, food and fuel shortages, and severe winter led to illnesses and deaths

Concentration camps

- The Nazis had been using concentration camps since 1933—often for political opponents.
- Thousands of Jews were taken to camps like Dachau following Kristallnacht.
- Germany's invasions of Poland & Soviet Union meant that there were now millions more Jews under their control.
- Initially, groups of SS troops Einsatzengruppen, murdered Jews by shooting.

The Final Solution

- The Wannsee Conference was a meeting of senior government held in Berlin at Wannsee - 20 January 1942.
- It was decided that most of the Jews of German occupied Europe would be deported to occupied Poland and murdered.

The Death Camps

- Auschwitz Birkeneau, Chelmno, Treblinka, Belzec, Sobibor, Majdanek in the far east of Poland.
- Death camps used gas chambers to murder Jews and others on an industrial scale. Jews were brought from all over Europe.

How did the Jews fight back?

The Jewish people did not simply accept what was happening to them. In the early years, they tried to escape. One way they did this was by emigrating to different countries, before they were stopped. Another way was by sending their children to live in Britain and Europe. Once in these new places, the children were given to foster families. As time progressed some Jewish people resisted, both violently and non-violently. One example is the Warsaw uprising that occurred from August to October 1944. This was a major operation by the Polish underground resistance to liberate Warsaw from German occupation. It was led by the Polish resistance (Home Army). The uprising was timed to coincide with the retreat of the German forces from Poland ahead of the Soviet advance.

How did the Holocaust end?

In 1944, liberation of the concentration camps began. As the allies advanced across Europe, they liberated (freed) prisoners from the camp. These people were sick and starving. The Nazis tried to destroy the evidence of the Holocaust. For example, in Auschwitz-Birkenau they tried to blow up the gas chambers to hide their atrocities. The more the allies progressed, the more the world discovered more details about what had been happening. In total, the Nazis murdered 6 millions Jewish people and 11 million in total, including disabled people and the travelling community.

Could the Holocaust have ended sooner?

The British government knew about the murder of Jews at Auschwitz Birkenau by the end of 1942. The allies were beginning to hear more details about the camps from prisoners who had escaped. Both British and American forces considered bombing the camp, however neither did for several reasons. It is a misconception that nobody knew what was happening in Germany.

Year 9 PRE – Term 1A and 1B : Is all life sacred?

Key Words

Sanctity of Life: The idea that life is sacred and given by God
Quality of Life: The standard of health, comfort and happiness experienced by an individual or group
Intrinsic Value: The idea that we have value automatically and naturally, and we cannot lose this.
Moral dilemma: A situation in which a difficult choice has to be made.
Soul: The spiritual or immaterial part of a human being or animal, regarded as immortal.
Conception: When sperm fertilises an egg.
Contraception: The act of preventing/stopping pregnancy.
Viability: When it is medically acknowledged that a foetus could survive outside the womb.
Abortion: The deliberate termination of a human pregnancy.
Saviour Siblings: The concept of creating a zygote through IVF (In-Vitro Fertilisation – outside of the body) which is a genetic match for a sick sibling.
Agape: The Christian teaching meaning compassionate love; showing kindness to those in need
Capital Punishment/ death penalty: punishing someone by death, lawfully, for crimes committed.
Deterrent: To put someone off e.g. the death penalty may put offenders off committing serious crimes.
Reformation: To help someone to change their ways.

What is the Sanctity of Life?

- Many religious believers, for example Christians and Muslims, believe that **all human life is sacred (special).** Life is a gift that should be valued.
- The concept of sanctity of life often stems from the belief that we were created by God, therefore we automatically have intrinsic value; we can never lose what it is that makes us so special.
- For example, in **Christianity**, the Bible teaches that ***'God breathed life into Adam',*** which teaches Christians that our special nature comes from God
- Many religions link our sacred nature with the idea of us having a **soul.**



When does life become sacred?

- The question of 'when does life begin' has been debated for many years.
- Many religious believers have clear views about abortion, and these beliefs generally stem from the debate of when we get our 'sacred' nature. Is it at birth, or some earlier point?

Conception 	- When the sperm meets the egg. - At the point, DNA has been determined and something has been created which, if it continues will become a human.
Heartbeat 	- A foetus' heartbeat can be detected 3-6 weeks into the pregnancy. - For many, it makes sense that if a foetus has a heartbeat, they are considered a 'life'.
Viability 	- This is when the foetus is considered 'viable' meaning that they would be likely to survive outside the womb. - Legally this is at 24 weeks and abortion is illegal under a number of circumstances after this point.
Birth 	- A full term pregnancy is considered to be 37-40 weeks. - This is when the baby is here is the world; we celebrate our birthdays from this point.

What are the moral issues surrounding abortion?

England	- Abortion was made legal in 1967 and a limit of 28 weeks was established, in 1990 the law changed, making the cut off 24 weeks. - Cut off for an abortion is 24 weeks in most circumstances, unless it is a life-or-death situation, the cut of can be extended. - 2 doctors must agree in most circumstances, 1 if it's a life-or-death situation.
Northern Ireland	- Abortion was made legal in March 2020. - Cut off for abortion is 12 weeks in Northern Ireland. - Limit of 24 weeks if it is a life-or-death situation. - In 2021, political leaders stated that women can still not access services to have a termination and have to travel to other parts of the UK to access medical care.

How do different Christian respond to abortion?

Methodists 	- Christianity teaches that life begins at conception, and we would receive our soul at that point too. - The Bible suggests that God has planned the life of every human, even before conception: ***'Before I formed you in the womb I knew you'.*** - Some Christians, such as Methodists, still disagree with abortion but would say it is **acceptable in some circumstances**, such as if the child would be severely disabled, or if the mother's life was at risk.
Catholics 	- Therefore, abortion does end a sacred life, meaning it is generally considered to be wrong. Catholics are very strict and follow a strong sanctity of life ethic, meaning they consider abortion to be murder and therefore against the 10 commandments: 'Do not commit murder'.

Should human life be created to save another?

- One advancement in medicine in recent times is the idea of **'Saviour Siblings'.**
- This is the idea that a child is born in order to provide an organ or cell transplant to a sibling that is affected by a fatal disease.
- The child is **conceived through IVF**, a procedure where the sperm and the egg are combined outside of the womb and, if they are a genetic match for the sick child, the fertilized egg will be implanted into the mother's womb. This fertilized egg is called a zygote.
- Whilst some people believe this offers a genius opportunity to save a child's life, others, such as **Roman Catholics**, believe it is not acceptable to create a child to simply use them to save another's life. A Catholic Archbishop taught: ***'To conceive a child to use him – even if it is to cure – is not respectful of his dignity'.***
- In addition, if a zygote is created that is not a genetic match, it is destroyed.
- Many religious believers would consider this zygote to already be a life.



Do our actions affect our sanctity of life?

- Some people do actions which do not respect the sanctity of life of others, for example they may commit crimes such as murder.
- If this happens, **does the criminal lose their sanctity of life**?
- Religious people would generally say no – you cannot 'lose' your sanctity of life, because it is intrinsic – it's just part of who we are.
- **<u>The Death Penalty:</u>**
- In some countries, those who take the life of others may be given the death penalty as a punishment. They may be killed, for example, by hanging or lethal injection.
- This is **not legal** in the UK but still happens in countries such as the USA, China and Saudi Arabia.
- **Reasons for the death penalty: *An eye for an eye***: if you kill, you deserve to be killed, It puts other people off committing such serious crimes (it's a **deterrent**), It brings justice to the family of the victim.
- **Reasons against the death penalty:** It goes against the sanctity of life – the criminal is still sacred, Christian quote: **'Human beings were made in God's image',** One of the **10 commandments: 'Do not kill'.**

Year 9 Spanish – Topic 1 – A past holiday

¿Adónde fuiste de vacaciones? Where did you go on holidays?

El año pasado last year
El verano pasado last summer
El invierno pasado last winter
Hace dos años two years ago
Recientemente recently

fui a
I went to

mi familia y yo fuimos a
my family and I went to

mis padres y yo fuimos a
my parents and I went to

España Spain
Escocia Scotland
Gales Wales
Francia France
Grecia Greece
Italia Italy
Turquía Turkey
los Estados Unidos the USA

Viajé
I travelled

Viajamos
We travelled

en autocar by coach
en avión by plane
en barco by boat
en coche by car
en tren by train



Star phrases

lo mejor fue cuando …
the best thing was when …

había mucho que hacer/ver
there was lots to do/see

Durante las vacaciones during the holidays
el primer día on the first day **el segundo día** on the second day
el último día on the last day

Fue
it was

una experiencia fantástica
a fantastic experience
una experiencia inolvidable
an unforgettable experience
un sueño hecho realidad
a dream come true

emocionante exciting
genial great
guay cool
increíble incredible
maravilloso marvellous
relajante relaxing

Me encantó I loved it
Me gustó I liked it
Lo pasé bien I had a good time
Disfruté mucho I enjoyed it a lot

porque
because

ya que
because

dado que
given that

cuando
when

compré recuerdos I bought souvenirs
descansé I relaxed
jugué al fútbol I played football
monté en bici I rode my bike
nadé en el mar I swam in the sea
pasé tiempo con familia I spent time with family
tomé el sol I sunbathed
visité monumentos I visited monumentos

descansamos we relaxed

nadamos we swam

comí comida deliciosa I ate delicious food
descubrí la cultura I discovered culture
descubrí la naturaleza I discovered nature
vi la puesta del sol I watched the sunset

descubrimos
we discovered

hice deportes acuáticos I did water sports
hice muchas cosas I did a lot of things
hice turismo I did sightseeing

hicimos
we did

fui a la playa I went to the beach
fui al parque temático I went to the theme park
fui de tapas I went for tapas
fui de excursión I went on a trip
fui de paseo I went for a walk

fuimos
we went

hacía buen tiempo
the weather was nice

hacía calor
the weather was hot

hacía sol
the weather was sunny

hacía mal tiempo
the weather was bad

hacía frío
the weather was cold

llovía
it was raining

Past Present Future

y and **o** or **pero** but **por ejemplo** for example **porque** because **entonces** so
sobre todo especially **si** if **también** also **primero** firstly **después** then **finalmente** finally

Year 9 Spanish – Topic 2 – Future hopes and dreams



¿Qué te gustaría hacer en el futuro? What would you like to do in the future?

Cuando sea mayor When I'm older **En el futuro** In the future	**voy a** I am going **espero** I hope **sueño con** I dream **quiero** I want	**ser** to be **trabajar como** to work as	**abogado**/**abogada** lawyer **artista** artista **cantante** singer **camarero**/**camarera** waiter/waitress **científico**/**científica** scientist **deportista** athlete **empresario**/**empresaria** entrepreneur **enfermero**/**enfermera** nurse	**influencer** influencer **ingeniero**/**ingeniera** engineer **médico**/**médica** doctor **peluquero**/**peluquera** hairdresser **periodista** journalist **policía** police officer **profesor**/**profesora** teacher **soldado** soldier
Si fuera rico/**rica** if I were rich **Si ganara la lotería** if I won the lottery **Si pudiera** if I could **Si tuviera dinero** if I had the money	**me gustaría** I would like **quisiera** I would like	**aprender muchas cosas** to learn lots of things **ayudar a la gente** to help people **casarme** to get married **comprar una casa grande** to buy a big house **estudiar en la universidad** to study at university **ganar mucho dinero** to earn lots of money **hacer deportes extremos** to do extreme sports **hacer voluntariado** to do volunteering	**ir de vacaciones de lujo** to go on luxury holidays **ser famoso**/**famosa** to be famous **ser feliz** to be happy **tener hijos** to have children **tomar un año sabático** to take a gap year **viajar por el mundo** to travel around the world **vivir en el extranjero** to live abroad	

Star phrases

(Para mí) lo más importante en la vida es …
(For me) the most important thing in life is …

Siempre he querido … I have always wanted …

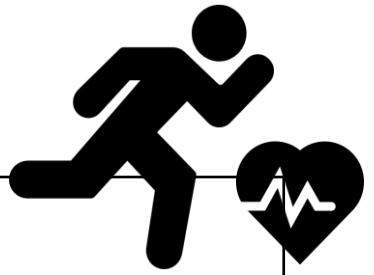
Desde pequeño/**pequeña he soñado con …**
Since I was little I have dreamed of …

Considero que I consider that **Creo que** I believe that **Diría que** I would say that **Pienso que** I think that	**será** it will be **sería** it would be	**emocionante** exciting **genial** great **gratificante** rewarding **increíble** incredible **maravilloso** marvellous **una experiencia fantástica** a fantastic experience **una oportunidad única** a unique opportunity **un sueño hecho realidad** a dream come true

Past Present Future

y and **o** or **pero** but **por ejemplo** for example **porque** because **entonces** so
sobre todo especially **si** if **también** also **primero** firstly **después** then **finalmente** finally

Year 9 Spanish – Topic 3 – Healthy living



¿Qué se debe hacer para estar en forma? What must you do to stay in shape?

Creo que I believe that
Diría que I would say that
Pienso que I think that
En mi opinión In my opinion

Para estar en forma
To stay in shape
Para tener buena salud
To have good health

me encanta I love to
me gusta I like to

suelo I tend to

tengo que I have to
hay que you have to

se debe you must
se puede you can

voy a I am going to

descansar relax
evitar el estrés avoid stress
montar en bici ride bike

dormir bien sleep well
seguir una dieta vegana/vegetariana follow a vegan/vegetarian diet
beber agua drink water
comer fruta y verduras eat fruit and veg
comer sano eat healthily

hacer deporte do sport
hacer ejercicio do exercise

ir al gimnasio go to the gym

porque because
ya que because

dado que given that

aunque even though

es it is

no es it isn't

bueno good

esencial essential

importante important

necesario necessary

para la salud física for physical health

para la salud mental for mental health

para el corazón for the heart

para el cuerpo for the body

para el bienestar for wellbeing

Star phrases

Voy a hacer un esfuerzo para
I'm going to make an effort to

Tengo la intención de
I intend to

Ojalá pudiera
I wish I could

no se debe
you must not

nunca se debe
you must never

no se puede
you can not

no voy a
I'm not going to

fumar cigarrillos smoke cigarettes
tomar drogas take drugs
vapear vape

beber demasiado alcohol
drink too much alcohol
comer comida basura eat junk food

malo bad

fatal awful

peligroso dangerous

Past Present Future

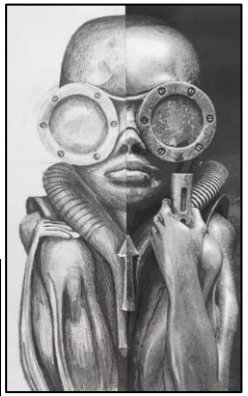
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ART AND DESIGN
AT ORMISTON SWB ACADEMY

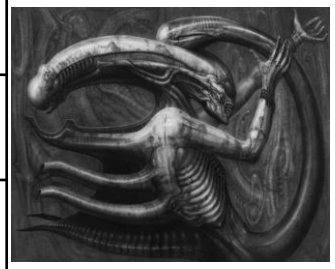
YEAR 9
KNOWELDGE ORGANISER
BIOMECHANICAL

Tone	Means the lightness or darkness of something. This can be a shade or how dark or light a colour appears.
Composition	The placement or arrangement of visual elements, thinking about space.
Directional shading	Shading that follows the contours of the form to create a 3D effect.
Gradient Blending	Is a visual technique of gradually transitioning from one shade to another, or one texture to another.
Anatomy	Bodily structure of humans or animals
Investigate	Test the qualities of materials, techniques or processes through practical work.
Skilful	Apply materials and techniques with a high level of understanding, ability and control.
Refine	Improve work taking into account feedback and aims.
Formal Elements	Key words that can be applied and used to describe 2D and 3D art and design.
Collage	Art made by sticking different materials or images together.

Throughout our Autumn project in Year 9 we will be influenced by literacy, inspiring your imagination and ideas. In our Biomechanical project we will gain deeper independence on compositional layouts and advanced observational record skills.



When adding tone to your observational drawing follow the below steps…
1 Look at your model carefully and ask the following questions: **'Where are the dark areas?' 'Where are the light areas?'**
2 Think about your **stroke size, direction** and **hold** on the pencil.
3 Aim to add at least **5 levels** of tone
4 Blend your tones to create a **gradation** (do not smudge!)
5 Look every **3 seconds** at your model to pick up the right tones





Artist Spotlight: H. R. Giger

H. R. Giger is a recognized as one of the world's most famous artists of Fantastic Realism. Born in 1940 in Switzerland, Giger studies Architecture and industrial design. Mostly famous for his surrealistic biomechanical dreamscapes both in fine art and film. Giger's work is showcased in the film Alien, receiving the Visual Effects Oscar.

Key word definitions
Line 1 - Realism (artwork that looks accurately real)
Line 3 – Architecture (designing and building structures)
Line 3 – Industrial design (design of a manufactured product)
Line 6 – Surrealistic (dream like)
Line 7 – Biomechanical (mechanics of a living body)
Line 11 – Visual effects (computer generated art)
Line 14 – Extra-terrestrial (a being from outer space)

ARTIST RESEARCH

Research into the artist
- Artist bio (one sentence)
- Artist techniques, skills and processes (one sentence)
- What is the title of the work? (if applicable)

Describe the Art
- What do you see in the work? What is happening?
- What is the context? (portrait, landscape, abstract)
- What words describe the work? (contemporary, delicate, bold)
- Can you link the work to other art pieces/movements?

Analyse the Art
- What is the medium of work? (pencil, paint, sculpture, digital)
- What visual elements/principles have been used?
  - Line - What mark–making techniques has the artist used?
  - Shape/Pattern/Form – What kind of shapes, patterns or forms can you find?
  - Tone /Colour - What colours or shading techniques does the artist use? How?
  - Texture – What kind of textures can you see/feel?
- What message does the work communicate? What do you think the work is about?

Evaluate the Art
- What do you think is good about the work? Why is it not good?
- How does the work make you feel? Why?
- Will you use the techniques or processes in your own work?
- How will this piece influence your future artwork?

Samba Music

Year 9 Music Knowledge Organiser

a. Key Words

Structure - How the sections of the music are put together.
Ostinato - A short repeated rhythmic or melodic pattern.
Ornamentation - Embellishing a melody.
Syncopation - Off beat.
Cross Rhythms - Two different rhythms at the same time.
Polyphonic Texture - More than two different rhythms at the same time.
Sambista - Leader of a Samba ensemble.
Rubato - Fluctuations in the tempo.
Son Clave - A syncopated rhythm in Samba music that has a 2:3 or 3:2 version.
Call and Response - A musical conversation where one instrument plays and another responds.

b. Artists



Bellini



Fundo de Quintal



Exaltasamba



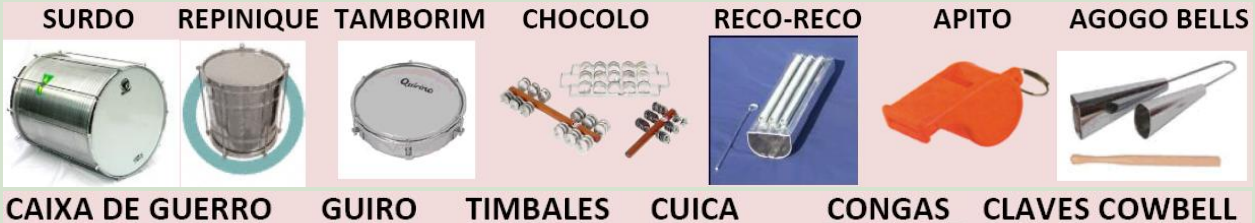
Shakira has been influenced by Samba music

c. History of Samba Music

Samba is a musical genre and dance style with its roots in Africa via the West African slave trade and African religious traditions. Samba is an expression of Brazilian cultural expression and is a symbol of carnival.

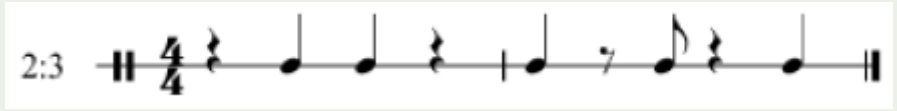
d. Typical Instruments in Samba

The instruments of Samba have been influenced by Portuguese colonies who imported slaves from Africa.



e. Rhythm and Metre

Samba music is built around **OSTINATOS** usually 4 or 8 beats long (regular phrases). Each group of instruments can have their own ostinato featuring **OFFBEAT RHYTHMS** and **SYNCOPATION**. Often the **SON CLAVE SYNCOPATED** rhythm is used, either the **2:3** or **3:2**. Samba music is built up of lots of different sections. For each section, the **SAMBISTA** will need to know an **OSTINATO.**





f. Structure

Samba music often starts with an **INTRODUCTION** often featuring **CALL AND RESPONSE RHYTHMS** between the Samba Leader and ensemble. The main Ostinato rhythm of Samba is called the **GROOVE** when all the instruments of the Samba Band play their respective rhythms over-and-over again forming the main body of the piece. The **GROOVE** is broken up by **BREAKS** - 4 or 8 beat rhythms providing contrast and **MID SECTIONS** – one or two instruments change the rhythm of their ostinato and the others stay the same or stop. Sometimes **BREAKS** and **MID SECTIONS** feature a **SOLOIST** who "shows off" their rhythms. The **SAMBISTA** must signal to the group when to change to a different section which is normally done with an **APITO** (Samba Whistle – loud!). A piece of Samba can end with either a **CALL AND RESPONSE** pattern or a pre-rehearsed ending phrase of rhythm. The **FORM AND STRUCTURE** of a piece of Samba may look like the following:

Intro	Groove	Break 1	Groove	Break	Groove	Mid-Section 1	Groove	Break 1	Groove	End

g. Key Features

- Texture varies (monophonic, polyphonic, call and response, cross-rhythms).
- Dynamics are loud.
- Tempo is fast.
- Based on rhythms. Only the different timbres of percussion provide different pitches. No melody.

h. Questions

1. What is the role of the Sambista?
2. What are the two versions of the son clave?
3. What happens in the groove section?
4. Name an artist that has been influenced by Samba music?

Minimalism

Year 9 Music Knowledge Organiser

A. What is Minimalism?

Minimalism is a musical style, that relies on the repetition of a limited number of small musical ideas, melodies, harmonies and rhythms. Throughout the repetitions, these musical ideas are changed gradually, so the effect is like an ongoing process rather than a style governed by the rules of more conventional music.

B. Minimalism in Art

Minimalism was originally a style in art before it became a type of music. Minimalism is an art movement that began in post–World War II Western art, most strongly with American visual arts in the 1960s and early 1970s.
Some examples of minimalist art/ artists include:

Frank Stella De Stijl Anne Truitt

C. Key Features

- It developed during the 1960s / 1970s.
- It is easy to hear what going on.
- It's made up of constantly repeated patterns called Loops; they are short and simple, although the final music can get quite long and complicated.
- There is no real tune, you can't sing along to minimalist music.
- Patterns are layered on top of each other, and they take a long time to change.

D. Tubular Bells

Tubular bells is a piece of minimalist music created by a composer called Mike Oldfield. It has many examples of repeating ostinatos, phase shifting, polyrhythms and other minimalist features. It became particularly famous when it was used in the soundtrack for the horror movie The Exorcist and is still associated with creating a horror movie atmosphere.

E. Key Words

Repetition - The repeating of a passage or note
Ostinato – A repeated pattern.
Cyclic rhythms – When a rhythm from the start of a piece is repeated at the end so the piece comes full circle.
Motif – A short musical phrase
Polyrhythms - A rhythm which makes use of two or more different rhythms simultaneously.
Phase shifting - Two or more versions of a sound or musical motif that are played simultaneously but slightly out of synch.
Tempo – The speed of a piece of music.
Musical layers – The different motifs, sounds etc. that are heard at the same time.
Musical phrases - A unit of musical meter that has a complete musical sense of its own
Textures – The way harmonies, melodies, rhythms, and timbres relate to create the overall effect of a piece of music.

F. Composers

Steve Reich - Stephen Michael Reich is an American composer known for his contribution to the development of minimal music in the mid to late 1960s. Reich's work is marked by its use of repetitive figures, slow harmonic rhythm, and canons.
La Monte Young - La Monte Thornton Young is an American avant-garde composer, musician, and artist recognized as one of the first American minimalist composers. His works are cited as examples of post-war experimental and contemporary music and were tied to New York's downtown music and Fluxus art scenes.
Philip Glass - Philip Glass is an American composer and pianist. He is widely regarded as one of the most influential composers of the late 20th century. Glass's work has been described as minimal music, having similar qualities to other "minimalist" composers such as La Monte Young, Steve Reich, and Terry Riley
Mike Oldfield -Michael Gordon Oldfield is an English multi-instrumentalist and composer. His work blends progressive rock with world, folk, classical, electronic, ambient, and new-age music.
Terry Riley -Terrence Mitchell Riley is an American composer and performing musician best known as a pioneer of the minimalist school of composition. Influenced by jazz and Indian classical music, his music became notable for its innovative use of repetition, tape music techniques, and delay systems.