

# Contents

English  
Mathematics  
Science  
French  
Geography  
History  
Religious Education  
Art  
Design and Technology  
Food and Nutrition  
PE  
At My Best

# English: 'An Inspector Calls' by J. B. Priestley

Characters		
<b>Inspector Goole</b>	Priestley's mouthpiece; advocates social justice; serves as the Birlings' conscience	Socialist, moralistic, righteous, powerful, intimidating, unconventional, mysterious, imposing, sardonic, omnipotent
<b>Mr. Arthur Birling</b>	Businessman; capitalist; against social equality; a self-made man (new-money)	Capitalist, arrogant, foolish, Panglossian, emasculate, prejudice, ignorant, selfish, stubborn, vainglorious
<b>Mrs. Sybil Birling</b>	Husband's social superior; believes in personal responsibility	Arrogant, cold-hearted, insincere, prejudice, naïve, conformist, bitter, controlling, remorseless
<b>Sheila Birling</b>	Young girl; comes to change views and pities Eva; feels regret	Transformative, remorseful, socialist, pseudo-inspector, sensitive, astute, strong-minded, empowered
<b>Eric Birling</b>	Young man, drinks too much; forces himself on Eva Smith; regrets actions	Rebellious, reckless, immature, insubordinate, compulsive, desperate, disgraced, dualistic, irresponsible
<b>Gerald Croft</b>	Businessman; engaged to Sheila; politically closest to Birling	Aristocratic, evasive, secretive, dishonest, disingenuous, oleaginous, chivalric, privileged, pragmatic
<b>Eva Smith</b>	Unseen in play; comes to stand for victims of social injustice (changes her name to Daisy Renton)	Suffragist, victim, emblematic, allegorical, vulnerable, desperate, socialist, moralistic, principled

Plot	
<b>Act 1</b>	Set in April 1912, Brumley, Midlands, UK. The Birling family and Gerald Croft are celebrating Sheila Birling's engagement to Gerald with a dinner. Mr Birling lectures his son, Eric Birling, and Gerald about the importance of every man looking out for himself if he wants to get on in life. Edna (the maid) announces that an inspector has arrived. Inspector Goole says that he is investigating the death of a young woman who committed suicide, Eva Smith. Mr Birling is shown a photograph of Eva, after initially denying recognising the woman in the photo, he remembers firing her in 1910 for organising a strike over workers pay. Sheila recalls also having Eva sacked about her manner when served by her in an upmarket department store. The Inspector reveals that Eva Smith changed her name to Daisy Renton. Gerald reveals to Sheila he had an affair with Daisy Renton.
<b>Act 2</b>	Gerald explains to The Inspector that he had an affair with Eva, but hasn't seen her since he ended their relationship back in Autumn 1911. Sheila gives her engagement ring back to Gerald. The Inspector turns his attention to Mrs Sybil Birling, she confesses that she also had contact with Eva, but Eva gave herself a different name to Mrs Birling. Eva approached a charity chaired by Mrs Birling to ask for help. Eva was desperate and pregnant but help was refused by Mrs Birling because she was offended by the girl calling herself 'Mrs Birling'. She tells Eva that the baby's father should be made entirely responsible. She also tells Inspector Goole that the father should be held entirely responsible and should be made an example of.
<b>Act 3</b>	Eric is revealed as the father. He stole money from Mr Birling's office to provide money to Eva. The Inspector delivers his final speech. After he leaves, the family begin to suspect that he was not a genuine police inspector. A phone call to the Chief Constable confirms this. Next, they phone the infirmary to be informed that no suicide case has been brought in. Mr Birling, Mrs Birling and Gerald congratulate themselves that it was all a hoax and they continue can continue as before. This attitude upsets Sheila and Eric. The phone rings. Mr Birling announces to the family that a girl has just died on her way to the infirmary, a police inspector is coming to question them

Word	Definition
Dramatic Irony	When the audience know more than the characters on stage
Setting	The place where the text is set
Monologue	When a character does a long speech on stage
Tone	The way in which a character might speak a line
Polemic	A strong verbal or written attack on someone or something
Euphemism	When someone talks about something unpleasant by using a more pleasant and nicer term
Capitalist	A political system based on people owning their own wealth and looking after themselves
Socialist	A political system based on people believing in shared wealth and responsibility
Bourgeoisie	The upper classes
Hierarchy	The order in which people exist within a social system
Prejudiced	Having or showing a dislike or distrust that is derived from a biased opinion
Patriarchal	A system of government that is controlled by men
Remorse	Sorrow or sadness when you do something wrong. Guilt.

Key concepts and context: Think about...	
<b>1912</b>	Set just before WWI and the sinking of the Titanic. A moment of rising international tensions and industrial expansion. End of Victorian era saw the demise of the rigid class system. Labour Party, founded in 1900, gaining momentum. The Russian Revolution began in 1917.
<b>1945</b>	People were recovering from six years of warfare, danger and uncertainty. Class distinctions greatly reduced as a result of two world wars. Women had a more valued place in society. Desire for social change. Following WW2, Labour Party won a landslide victory over Winston Churchill and the Conservatives.
<b>Wealth, Power and Influence</b>	The Birlings and the Crofts are representative of the wealthy upper-class. They all misuse their social influence to benefit themselves. Their actions adversely affect the vulnerable people in society.
<b>Blame and Responsibility</b>	Who is to blame for Eva's death? Each of the Birlings contribute to a chain of events leading to the destruction of Eva Smith. What responsibilities do the characters have to each other? To society?
<b>Public v Private</b>	How do the public lives, the facades, of the Birlings juxtapose their private personas? What are their motivations for this? What are the repercussions, and for who?
<b>Morality and Legality</b>	What are the moral and legal laws of the society depicted in the play? How do they interweave? What actions do the characters undertake that are wrong, morally or legally?
<b>Class Politics</b>	How do the ideologies of capitalism and socialism collide in the play? Which characters are representative of which political allegiance? Is there a correlation between a character's political beliefs and their behaviours?
<b>Prejudice</b>	What are the prejudices held by the Birlings? What are their inherent views regarding class and status? How do they act on these prejudices, and what are the consequences?
<b>Young v Old</b>	What differences are evident between the younger and older generation? They react and behave differently throughout the play – why? What are their attitudes towards each other? What do they learn? Which characters change, and how?

ACT	Order of the Inspector's Questioning
Act 1	Sheila and Gerald's engagement is celebrated.
Act 1	Birling says there will be no war; references Titanic
Act 1	Inspector arrives; a young girl has committed suicide.
Act 1	Birling threw her out after strike; Sheila had her fired for laughing.
Act 2	Gerald had an affair with Daisy Renton
Act 2	Mrs. Birling refused to give charity to Eva; blames father.
Act 3	Eric's involvement revealed; possible rape hinted at.
Act 3	Inspector leaves. Gerald returns; met policeman, no Inspector G
Act 3	Telephone rings; an inspector is coming.

Key Notes
Priestley asks his audience to examine their <b>individual</b> and <b>collective responsibility</b> to society. He wants a <b>welfare state</b> .
The <b>hypocrisy</b> of <b>middle-class Edwardian</b> society is uncovered: <b>appearance &amp; reputation</b> matter more than <b>reality &amp; morality</b> .
Priestley criticises the selfishness of <b>capitalism</b> and wants a fairer, <b>socialist</b> future after the horrors of two world wars..
Priestley shows the <b>older generation</b> to be set in their ways, while the young are <b>open to change</b> .
Eva Smith is the <b>embodiment</b> of young, <b>working-class women</b> who were <b>oppressed</b> by the <b>middle/upper classes</b> .
The play demonstrates that when workers do not have <b>full employment rights</b> they cannot fight back

Character Quotes	
<b>Birling's Confidence</b>	'We're in for a time of steadily increasing prosperity'
<b>Birling on society</b>	'The way some of these cranks talk and write now, you'd think everybody has to look after everybody else'
<b>Sheila's recognition</b>	'but these girls aren't cheap labour – they're people''
<b>Sheila's regret</b>	'it's the only time I've ever done anything like that, and I'll never, never do it again to anybody'
<b>Sheila on the inspector</b>	'we all started like that – so confident, so pleased with ourselves until he began asking us questions'
<b>Sheila on Eric</b>	'he's been steadily drinking too much for the last two years'
<b>Inspector on guilt</b>	'I think you did something terribly wrong – and that you're going to spend the rest of your life regretting it'
<b>Mrs Birling defends herself</b>	'she was claiming elaborate fine feelings and scruples that were simply absurd in a girl in her position'
<b>Eric explains</b>	'I'm not very clear about it, but afterwards she told me she didn't want me to go in but that – well, I was in that state when a chap easily turns nasty – and I threatened to make a row'
<b>The inspector says</b>	'but each of you helped to kill her. Remember that'
<b>Inspector's message</b>	'there are millions and millions and millions of Eva Smiths and John Smiths still left with us, with their lives, their hopes and fears, their suffering, and chance of happiness, all intertwined with our lives, with what we think and say and do. We don't live alone.'

### Thematic Quotes

<b>Social responsibility</b>	"We are responsible for each other" <i>Inspector</i> "Public men, Mr Birling, have responsibilities" <i>Inspector</i> "It's what happened to the girl and what we all did to her that mattered." <i>Eric</i>
<b>Capitalism</b>	"These silly capital vs labour agitations." <i>Birling</i> "A man has to make his own way" <i>Birling</i>
<b>Class</b>	"A girl of that class" <i>Mrs Birling</i> "Well, we've several hundred young women there, y'know, and they keep changing." <i>Birling</i>
<b>Age</b>	"the famous younger generation" <i>Birling</i> "What's the matter with that child?" <i>Birling</i> "Just keep quiet, Eric" <i>Birling</i>
<b>Gender &amp; attitudes to women</b>	"I hate those <i>hard-eyed dough-faced women</i> " - <i>Gerald</i> "And you think young women ought to be protected against unpleasant and disturbing things?" <i>Inspector</i> "She had far too much to say, far too much" <i>Birling</i>

- Paper 1 Section B
- Extract question
- No choice of question
- 45 minutes

## English Literature: Paper 1

### A Christmas Carol

#### A Christmas Carol – Context

##### Dickens' Life

Charles Dickens was born in 1812 in Kent and moved to London at the age of 9. When he was 12 years of age, his father was arrested and sent to a debtors' prison. Dickens' mother moved seven of their children into prison with their father but took Charles out of school and arranged for him to live alone outside the prison, working with other child labourers in a terrible job which involved pasting labels on bottles in a blacking (shoe polish) warehouse; he was poorly paid and the conditions were extremely bad. Much of Dickens' writing is influenced by his early experiences.

##### Social and Historical Context

Dickens was born into a time of great change in the way people lived. The Industrial Revolution was taking place and there was a sudden growth in the cities – the economy shifted from agriculture to industry and trade. As a result, many people who had once lived in rural communities moved to the city in huge numbers, causing overcrowding. Money from industry made the rich richer and the rich/poor gap widened. Workers had to toil for long hours for little money and, out of necessity, children of all ages often did not go to school and worked long hours for little money. Compulsory education was introduced by Queen Victoria so many children were taught to read and write in Victorian times where they would not have been early. However, despite this, most poor children still ended up in low-paid jobs and working in appalling conditions. The housing was dreadful for working class families who often lived in squalor and deprivation where disease spread rapidly. There was no NHS and so poor people rarely had access to any form of medical help if they fell ill. Child mortality was very high. In the poorer quarters of the big cities, almost 1 in 5 children born had died by the age of five. The main cause of death was polluted drinking water, damp, and tuberculosis, which claimed between 60,000 and 70,000 lives in each decade of Queen Victoria's reign. Disease spread rapidly due to over-crowding and also due to the very unhygienic way that the poor had to live as they had little access to clean water. For those who were unable to work and support themselves, there were workhouses. These were not intended to be pleasant places to stay. Men, women, and families were separated and those who were physically able were expected to work for their keep. Like the workhouses there were debtors' prisons (those who were unable to pay a debt went here) such as a Marshlea, where Charles Dickens' father spent time. If you could not look after your family the workhouse was the only option that you had, or your family would be left to starve. There was no system to support those who could not work and so people found themselves with little choice. The wealthy few, on the other hand, lived in luxury with large houses, plenty of money and food. Their children did not work, were educated, and often had expensive toys and nice clothes. The rich had to be seen to be civilised and adhere to a strict set of morals that were considered very important for high society in the Victorian age. Victorians are well known for being prudish and overly polite in their interactions for this reason. However, this was often criticised for being hypocritical, because the rich lived such different lives to the poor and often did little to help them.

##### A Christmas Carol

During this time of unrelenting social change, Dickens wrote A Christmas Carol. Firstly, he wanted to write a good 'ghost' story - these were extremely popular at the time and he had hoped that this would be a good story for families to enjoy sitting around the fire on a cold winters night. Victorians were extremely interested in the supernatural and many of them firmly believed in ghosts and the idea of spirits visiting them from the dead and so the story would not have seemed at all far-fetched or unrealistic to them. However, he also had the intention of drawing readers' attention to the plight of England's poorest, a recurring theme in many of his novels. As such, the novella can be read as a social criticism, an allegory.

##### Malthusian Theory

Thomas Malthus was an English demographer and political economist best known for his pessimistic but highly influential views on population growth.

Malthus famously argued that in a world in which economies grew arithmetically and population grew geometrically, mass want would be inevitable. His *Essay on Population* created a school of thought which continues to this day under the banners of Zero Population Growth and Sustainability. The threat of a "population bomb" under which my generation lived was Paul Ehrlich's modern rehashing of the Malthusian argument about the inability of productivity to keep pace with, let alone exceed, population growth.

#### **Characters:**

**1. Ebenezer Scrooge:** Miserly, mean, bitter, materialistic, unsympathetic, indifferent, cold, selfish, isolated, cynical, charitable, value driven, generous, happy, sociable, transformed.

**2. Marley's Ghost:** Materialistic, self-centred, terrifying, haunting, exhausted, direct, reformed, regretful, hopeful, selfless, wise

**3. Bob Cratchit:** Uncomplaining, tolerant, courteous, deferential, patient, civil, eager, pleasurable, good-humoured, playful, caring, tender, cheerful, loving, forgiving.

**4. Fred:** Warm-hearted, empathetic, cheerful, optimistic, even-tempered, insightful, determined, generous, forgiving, jovial, enthusiastic, caring

**5. Ghost of Christmas Past:** Contradictory, strong, gentle, quiet, forceful, questioning, mysterious

**6. Ghost of Christmas Present:** Compassionate, abundant, generous, cheerful, jolly, friendly, severe, sympathetic

**7. Ghost of Christmas Future:** Mysterious, silent, ominous, intimidating, frightening, resolute

**8. Tiny Tim:** Frail, ill, good, religious

## The Plot

### Stave One

1. Introduced to Ebenezer Scrooge on Christmas Eve. He is a lonely miser obsessed with money. He has a clerk called Bob Cratchit who is not treated well. We learn Jacob Marley, Scrooge's business partner, died exactly 7 years earlier. Scrooge is irritated that Christmas Day seems to be interrupting his business. Scrooge is visited by his nephew Fred, who invites his uncle to Christmas dinner. Scrooge refuses. Scrooge is visited by two charity workers, asking for donations. Scrooge refuses and exclaims he wants to be left alone. Scrooge allows Bob to have Christmas Day off. Scrooge, when he is home, is visited by the Ghost of Jacob Marley – warning him he will be visited by three more ghosts to help him change his ways.

### Stave Two

Scrooge is visited by the Ghost of Christmas Past who takes him to witness his past. Scrooge is taken first to his schoolboy years and he is reminded how his friends would go home from Christmas while he was left at school. We see him with his sister, who one year took him home for the holidays. Next we are shown Scrooge as a young apprentice, working for Fezziwig. Dickens describes the Christmas ball Fezziwig organised for his employees. Finally, Scrooge is taken to see his ex-fiancée, Belle. We see the scene when they break up, as money has taken over Scrooge's life. Scrooge cannot bear to see any more and struggles with the spirit.

### Stave Three

Scrooge is then visited by the Ghost of Christmas Present. The spirit shows Scrooge how the Cratchit family celebrate Christmas. Scrooge asked if Tiny Tim will live. The spirit explain unless there are changes, he will die. Scrooge is then taken to see how others celebrate Christmas: miners, lighthouse workers, sailors on a ship and to Fred's house at Christmas, where they are playing games. The spirit then begins to age, and see under the spirit's robes two children: Ignorance and Want. The Ghost of Christmas Future then appears.

### Stave Four

The Ghost of Christmas Future is described. The spirit takes Scrooge to see a group of businessmen discussing someone who has died. Scrooge is then taken to see Old Joe, where he is in the process of buying property of the dead man – which have been stolen. Scrooge then returns to Bob Cratchit's house, where it is revealed Tiny Tim has died. Scrooge is then taken to the graveyard and is shown a grave stone and realises this is for him. Scrooge falls to his knees and begs that he will change his ways.

### Stave Five

Scrooge wakes up in his own bed. Scrooge wonders how much time has passed and calls to a boy. He then sends the boy to the poulterer for the prize turkey to give to Bob Cratchit, Scrooge meets one of the charity collectors from earlier and whispers to him that he will give a large donation. Scrooge then goes to Fred's house and is welcomed in. He enjoys the dinner and party. On Boxing Day, Scrooge arrives early to work, and plays a trick on Bob. Scrooge then tells him he is going to raise his salary and promises to help Bob's struggling family. Scrooge is described to have completely changed and becomes a 'second father' to Tiny Tim – 'who did not die.'

## Key Quotations (AO1):

### **Stave One**

"a squeezing, wrenching, grasping, scraping, clutching, covetous old sinner" – about Scrooge

"Solitary as an oyster" – about Scrooge

'A tight-fisted hand at the grind stone' – about Scrooge

"B'ah! Humbug!" – Scrooge's reaction to Christmas

"Are there no prisons? Are there no workshouses?" – Scrooge's

reaction to the charity men asking for money to support the poor

"If they are to die they had better do it, and decrease the surplus population!" – Scrooge's reaction to hearing that poor people would rather die than go to the workhouse. This quotation links to Malthusian theory (see other side of sheet)

'His face was ruddy and handsome, his eyes sparkled' – Fred (presented as the opposite to Scrooge)

'I wear the chain I forged in life' – Ghost of Marley

### **Stave Two**

'It wore a tunic of the purest white... from the crown of its head

there sprung a bright clear jet of light' – Ghost of Christmas Past

'A lonely boy was sat reading near a feeble fire' – Scrooge as a young boy

"A solitary child, neglected by his friends" – Scrooge as a young boy

"Another idol as displaced me. A golden one." – What Belle tells

Scrooge before she leaves him.

"Your lip is trembling,' said the Ghost, 'And what is that upon your cheek?' – first sign of emotion from Scrooge

### **Stave Three**

'There sat a jolly Giant, who wore a glowing torch...it was clothed in one simple green robe' – Ghost of Christmas Present

'God bless us everyone!' – Tiny Tim's positive attitude

'Tell me Tiny Tim will live...' – Scrooge showing compassion.

"I see a vacant seat" – The Ghost's prediction about Tiny Tim if the future is not changed.

"The whole quarter reeked with crime, with filth, with misery" – A description of one of the poorer parts of London – symbol of poverty.

"This boy is Ignorance. The girl is Want. Beware them both.." – A description of the children, Ignorance and Want.

### **Stave Four**

'The phantom slowly, gravely, silently approached' – Ghost of Christmas Yet to Come

'I fear you more than any spectre I have seen' – Scrooge

'Tell me I may sponge away the writing on this stone!' – Scrooge desperate to change his ways

'I will honour Christmas in my heart' - Scrooge

### **Stave Five**

"I am as light as a feather. I am as happy as an angel. I am as merry as a schoolboy. I am as giddy as a drunken man!"

'I'll raise your salary Bob and endeavour to assist your struggling family' – Scrooge changing his ways.

'to Tiny Tim, who did NOT die, he [Scrooge] was a second father' – Scrooge changing his ways

'Wonderful party, wonderful games, wonderful unanimity, won-der-ful happiness!' – repetition shows Scrooge's joy at the end.

Redemption	The act of making up for something that you have done wrong
Benevolence	Kindness and generosity
Charity	Love for others and kindness in your treatment of other people
Humanity	The quality or state of being human
Ignorant	Having littler or no knowledge – being unaware either by accident or by choice
Inferior	Situated lower down from others
Superior	Situated higher up from others
Surplus	An extra amount – the amount that is more than what is needed
Misanthropy	A hatred or distrust of humankind in general
Materialistic	Being overly obsessed with material things and money
Transformed	To change completely
Regretful	To feel regret about your past actions
Empathetic	An ability to understand how people are feeling by putting yourself in their position
Resolute	To be firmly determined
Ominous	Giving a sign of future trouble or evil
Allegory	A story that contains characters and events that reflect a bigger political or social message
Gothic	Having elements of the gothic genre, often reflected in dark and ominous settings, the supernatural and elements of mystery

# Mathematics

## Properties of Quadrilaterals

Shape name	Drawing	Properties
Square		<ul style="list-style-type: none"> <li>Four equal sides</li> <li>Four right angles</li> <li>Opposite sides parallel</li> <li>Diagonals bisect each other at right angles</li> <li>Four lines of symmetry</li> <li>Rotational symmetry of order four</li> </ul>
Rectangle		<ul style="list-style-type: none"> <li>Two pairs of equal sides</li> <li>Four right angles</li> <li>Opposite sides parallel</li> <li>Diagonals bisect each other</li> <li>Two lines of symmetry</li> <li>Rotational symmetry of order two</li> </ul>
Rhombus		<ul style="list-style-type: none"> <li>Four equal sides</li> <li>Two pairs of equal angles</li> <li>Opposite sides parallel</li> <li>Diagonals bisect each other at right angles</li> <li>Two lines of symmetry</li> <li>Rotational symmetry of order two</li> </ul>
Parallelogram		<ul style="list-style-type: none"> <li>Two pairs of equal sides</li> <li>Two pairs of equal angles</li> <li>Opposite sides parallel</li> <li>Diagonals bisect each other</li> <li>No lines of symmetry</li> <li>Rotational symmetry of order two</li> </ul>
Kite		<ul style="list-style-type: none"> <li>Two pairs of adjacent sides of equal length</li> <li>One pair of equal angles</li> <li>Diagonals intersect at right angles</li> <li>One line of symmetry</li> </ul>
Arrowhead		<ul style="list-style-type: none"> <li>Two pairs of adjacent sides of equal length</li> <li>One pair of equal angles</li> <li>Diagonals intersect at right angles outside the shape</li> <li>One line of symmetry</li> </ul>
Trapezium		<ul style="list-style-type: none"> <li>One pair of parallel sides</li> <li>Isosceles quadrilaterals of this kind have one line of symmetry.</li> </ul>

### Substituting into formulae

Once we have found out or written a formula, this gives us a rule or method to work with. We can then substitute in the values we know to get an answer.

Here is the formula for the area of a rectangle:

$$\text{Area} = \text{length} \times \text{width} \quad A = lw$$

If we know that the length = 5cm and width = 4cm...

$$\text{Or } l = 5, w = 4 \dots$$

We can substitute these values in to find the area.

$$A = lw = 5 \times 4 = 20 \text{ (cm}^2\text{)}$$

This formula calculates Body Mass Index (BMI).  $\text{BMI} = \frac{\text{weight}}{\text{height}^2} = \frac{w}{h^2}$

If a person was 1.6m tall, (h = 1.6) and weighed 60 kg... (w = 60)

$$\text{BMI} = \frac{w}{h^2} = \frac{60}{1.6^2} = \frac{60}{2.56} = 23.4375$$

A BMI of 23.4 (ish) is healthy. This person would not need to lose weight (but should be careful not to gain too much more).

**Watch Out!** Think BIDMAS: We need to calculate the power before we do the division.

### Inequalities on a number line

An **open circle** means that the value is **not included**:

- $x > 2$  x is greater than 2
- $x < 5$  x is less than 5

A **filled in circle** means that the value is **included**:

- $x \geq 3$  x is greater than or equal to 2
- $x \leq 6$  x is less than or equal to 6

If x is **between two values**, use **two circles**:

- $1 < x \leq 6$  x is greater than 1, but less than or equal to 6.

### Algebra

You can solve **two-sided inequalities** using a balancing method.

**Example 5**

Solve  $7 < 2x - 1 < 13$

$$7 + 1 < 2x - 1 + 1 < 13 + 1$$

→ Add 1 to all the parts.

$$8 < 2x < 14$$

$$\div 2 \quad 4 < x < 7$$

→ Divide by 2.

Rearrange the formula to make **v** the subject

$$e = \frac{3v + t}{5}$$

$$\times 5 \quad 5e = 3v + t$$

$$-t \quad 5e - t = 3v$$

$$\div 3 \quad \frac{5e - t}{3} = v$$

Our answer should say ...  $v = \frac{5e - t}{3}$

### Perimeter: Add all sides

$$6 + 4 + 2 + 3 + 4 + 7 = 26 \text{ cm}$$

Shape	Formula
<b>Triangle</b>	Area = $\frac{1}{2}b \times h$ b = base h = height
<b>Rectangle</b>	Area = $w \times h$ w = width h = height
<b>Trapezoid</b>	Area = $\frac{1}{2}(a+b) \times h$ h = vertical height a, b are the parallel sides
<b>Parallelogram</b>	Area = $b \times h$ b = base h = vertical height

### Converting AREA Units

AREA consists of Square Units, so we need to SQUARE all our Lengths.

$\text{Km}^2$	$\text{m}^2$	$\text{cm}^2$	$\text{mm}^2$
$\div 1000^2$	$\div 100^2$	$\div 10^2$	

$5\text{km}^2 = ? \text{m}^2$  Need to  $\times 1000^2$      $5 \times 1000 \times 1000 = 5\,000\,000 \text{m}^2$  ✓

$1200\text{cm}^2 = ? \text{m}^2$  Need to  $\div 100^2$      $1200 \div 100 \div 100 = 0.12 \text{m}^2$  ✓

Expression	Made up of algebraic terms – no equals sign!	$5a + 2b$ $3(l + w)$
Equation	Contains an equals sign! Can be solved but only for some (not all) values of x (or any variable).	$x + 4 = 10$ $p^2 + 3p + 2 = 0$
Identity	Is true for all values of x (or variable). Sometimes shown with $\equiv$ sign (is identically equal/equivalent to)	$x + x + x \equiv 3x$ $5(a - 3b) \equiv 5a - 15b$
Formula	A rule linking two or more variables. Often a "real-life" equation.	$E = mc^2$ $A = \pi r^2$

### ANGLE PROPERTIES

Take a triangle. Tear off the angles. They add up to 180°

Angles in a triangle add up to 180°

Angles on a straight line add up to 180°

Take a quadrilateral. Tear off the angles. They add up to 360°

Angles in a quadrilateral add up to 360°

Angles around a point add up to 360°

#### ANGLE PROPERTIES OF PARALLEL LINES

**CORRESPONDING ANGLES**

**VERTICALLY OPPOSITE ANGLES**

**ALTERNATE ANGLES**

**INTERIOR ANGLES**

### POLYGONS

A POLYGON IS A MANY - SIDED FIGURE

A polygon is called regular when all its sides and angles are equal and irregular when the angles and sides are not all equal.

#### INTERIOR ANGLE SUM

3 SIDES, 1 TRIANGLE, 180°	4 SIDES, 2 TRIANGLES, 360°	5 SIDES, 3 TRIANGLES, 540°
6 SIDES, 4 TRIANGLES, 720°	7 SIDES, 5 TRIANGLES, 900°	

NOTICE THE PATTERN, there are always 2 fewer triangles than sides.

#### EXTERIOR ANGLE SUM

The exterior angles of ANY POLYGON add up to 360°

In a REGULAR POLYGON each exterior angle =  $\frac{360^\circ}{\text{No. of angles}}$

Interior angle + exterior angle = 180° (Angles on a straight line)

### Congruent Shapes

Congruent figures have the same shape and the same size.

**12-1**

**Congruent**  
Same shape  
Same size

**Not Congruent**  
Different shape

**Not Congruent**  
Different size

**Congruent**  
Same shape  
Same size

**Not Congruent**  
Different shape

**Not Congruent**  
Different size

### Volume of a cuboid

We can find the volume of a cuboid by multiplying the base by the height.

The area of the base = length  $\times$  width

So, Volume of a cuboid = length  $\times$  width  $\times$  height =  $lwh$

$3\text{m}^3 = ? \text{cm}^3$  Need to  $\times 100^3$      $3 \times 100 \times 100 \times 100 = 3\,000\,000 \text{cm}^3$  ✓

#### Surface area of a cuboid

To find the surface area of a shape, we calculate the total area of all of the faces.

So the total surface area =

- $2 \times 40 \text{cm}^2$  Top and bottom
- $+ 2 \times 35 \text{cm}^2$  Front and back
- $+ 2 \times 56 \text{cm}^2$  Left and right side

$= 80 + 70 + 112 = 262 \text{cm}^2$

### Triangular Prism

$V = B \cdot h$

$SA = P \cdot h + 2 \cdot B$

$B = \frac{b \cdot h}{2}$ ,  $P = b + h + l$

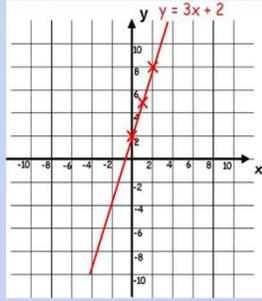
# Mathematics

## Plotting Straight Line Graphs

- To plot a graph, you need to know at least 3 points

Plot a graph of the equation:

$$y = 3x + 2$$



Choose any values for x, what y value will

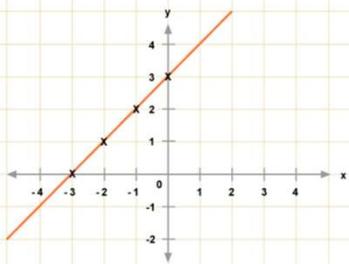
$x = 0$	$y = 2$	(0, 2)
$x = 1$	$y = 5$	(1, 5)

### Graph plotting

On the previous page we worked out the values of  $y = x + 3$ . These points can be plotted on a graph. Each pair of values in the table is an (x, y) coordinate - eg (-3, 0) (-2, 1) (-1, 2) (0, 3) etc.

x	-3	-2	-1	0	1	2	3
y = x + 3	0	1	2	3	4	5	6

Take a look at the graph  $y = x + 3$  and see how the values are plotted.



### Finding nth term of linear sequence

1) 6, 10, 14, 18, 22 The sequence increases by 4, so the nth term starts with 4n

Now compare the sequence to the 4 times table

6, 10, 14, 18, 22 Each term is 2 bigger than the 4 times table  
 $\uparrow +2$   $\uparrow +2$   $\uparrow +2$   $\uparrow +2$   $\uparrow +2$   
 4, 8, 12, 16, 20 So the nth term is  $4n + 2$

### Finding the equation of the line

**Example 1**

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

Y intercept = 0

Equation:  $y = 2x + 0$  or  $y = 2x$

**Example 2**

Gradient =  $-\frac{2}{3}$

Y intercept = 5

Equation:  $y = -\frac{2}{3}x + 5$

**Remember**

Best way to find out a gradient

- 1) Draw a triangle, going from left to right
- 2) Change in y and change in x?
- 3) Use the formula:

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

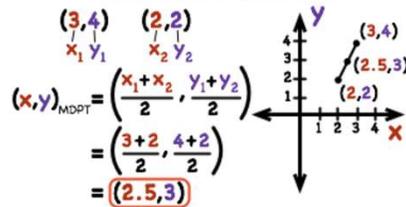
**Remember**

The y intercept is the point on the y axis where the straight line cross the y axis

**Remember**

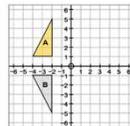
$y = mx + c$   
 m is gradient c is y-intercept

### FIND THE MIDPOINT



### Describing Reflections

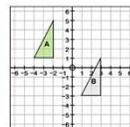
1. The line of symmetry



- The line of symmetry is the X axis

### Describing Translations

1. Movement left or right
2. Movement up or down
- Or write the column vector



- Translation of 5 to the right and 4 down
- $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

## Data & Statistics

### Working with the Cartesian Plane

### CALCULATING THE MEAN

On his first six formal exams, Jose earned grades of 85, 81, 100, 94, 96, and 95. What is the Mean of his exam scores?

First add the numbers:  
 $85 + 81 + 100 + 94 + 96 + 95 = 551$

Then, divide by the amount of numbers you added:

$$551 \div 6 = 91.83$$

The table below show the mark in an examination of a set of students. Calculate the modal and median class.

Mark	Frequency
0-9	2
10-19	7
20-29	11
30-39	12
40-49	2

The modal class is the one with the highest frequency  
 modal class = 30-39

### Finding the Median From a Frequency Distribution Table

Score x	Freq f	cf
2	3	3
3	7	10
4	2	12
5	6	18
6	5	23
7	2	25

3 scores so far  
 10 scores so far  
 12 scores so far  
 13th score is a 5

The median is 5

25 scores  $\rightarrow 25 \div 2 = 12.5 \rightarrow 13$   
 The median is the 13th score.

### How to Find Median Using Stem-and-Leaf Plots

The median can be found by counting from either end of the plot until the center is found. If there are an even number of data values, the two center numbers are averaged.

Stem	Leaves
5	4
6	
7	9-2
8	0-1-5-5-9
9	2-4-4
10	4

85 = median

15, 16, 21, 23, 23, 26, 26, 30, 32, 41

### Stem Leaf

1	5 6
2	1 3 3 6 6
3	0 2
4	1

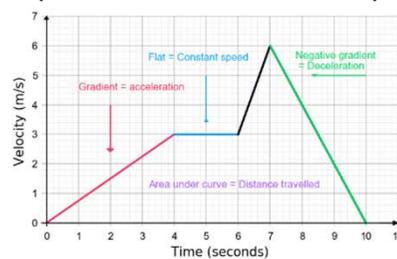
how to place "32"

Mode: Most frequent value on stem and leaf

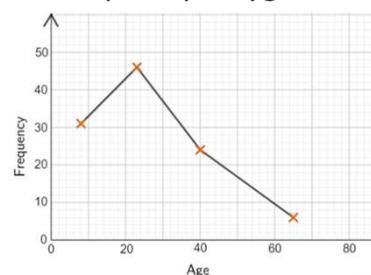
Range: Greatest value – smallest value

Age, a	Frequency	Midpoint
$0 < a \leq 16$	31	8
$16 < a \leq 30$	46	23
$30 < a \leq 50$	24	40
$50 < a \leq 80$	6	65

### Speed Distance Time Graph



### Frequency Polygon



	Mode	Median	Mean
<b>Advantages</b>	- Very easy to find - Not affected by extreme values - Can be used for non-numerical data	- Easy to find for ungrouped data - Not affected by extreme values	- Easy to find - Uses all the values - The total for a given number of values can be calculated from it.
<b>Disadvantages</b>	- Doesn't use all the values - May not exist	- Doesn't use all the values - Often not understood	- Extreme values can distort it. - Has to be calculated
<b>Used for</b>	- Non-numerical data - For finding the most likely value	- Data with extreme values	- Data whose values are spread in a balanced way.

Sampling helps estimate the characteristics of a large population through the use of a smaller representative group. This can be useful in market research, medical testing, and product development.

# Angles and Triangles

## Understand and represent bearings

- A bearing is always measured from **NORTH**
- It is always given as three figures

The angle indicated starts from the North line at A and joins the path connecting A to B.

This angle shows the bearing of B from A

The bearing of B from A is calculated by measuring the highlighted angle.

Using **estimation** it is clear this angle is between 090° and 180°

The sentence... "Bearing of \_\_\_ from \_\_\_" is really important in identifying the bearing being represented.

## Angle notation

The letter in the middle is the angle. The arc represents the part of the angle.

Angle Notation: three letters **ABC** This is the angle at B = 113°

**∠ABC** is also used to represent the angle at B.

## Measure and read bearings

The bearing of the cow to the barn

This angle is measured from **NORTH**. It is measured in a clockwise direction. **Estimation** indicates this angle is between 180° and 270°. Use a protractor to measure accurately. Remember bearings are written as three figures.

The auxiliary line is drawn to help you measure and draw the angle that is measured to represent the bearing.

## Key point 3

The sum of the interior angles of a polygon with  $n$  sides =  $(n - 2) \times 180^\circ$

### Example 2

Work out the sum of the interior angles of a pentagon.

A pentagon has five sides. Sketch a pentagon. Draw in the diagonals from one vertex to all the other vertices.

The pentagon has been divided into 3 triangles. The angle sum of each triangle is 180°.

Sum of the interior angles of a pentagon =  $3 \times 180^\circ = 540^\circ$

## Sin, Cos, Tan: Angles

### Inverse trigonometric functions

Label your triangle and choose your trigonometric ratio

Substitute values into the ratio formula

$\theta = \tan^{-1} \frac{\text{opposite side}}{\text{adjacent side}}$

$\theta = \sin^{-1} \frac{\text{opposite side}}{\text{hypotenuse side}}$

$\theta = \cos^{-1} \frac{\text{adjacent side}}{\text{hypotenuse side}}$

$\tan \theta = \frac{3}{4}$

$\theta = \tan^{-1} \frac{3}{4}$

$\theta = 36.9^\circ$

### Bearings with right-angled geometry

Look for Right-angles Pythagoras Trigonometry (Sin, Cos, Tan)

Don't forget the 90° here too

Use  $\tan^{-1} \frac{15}{20}$  to calculate this angle

"Due East" bearing of 090° makes a 90° angle

"Due West" bearing of 270° makes a 90° angle

A plane flies East for 20km then turns South for 15km. Find the bearing of the plane from where it took off.

## Key point 6

In a right-angled triangle the longest side called the hypotenuse. Pythagoras' theorem states that, in a right-angled triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

$c^2 = a^2 + b^2$

## Example 5

Calculate the length of the hypotenuse. Give your answer correct to 2 significant figures.

$a = 5, b = 4, c = x$

$c^2 = a^2 + b^2$

$x^2 = 5^2 + 4^2$

$x^2 = 25 + 16$

$x^2 = 41$

$x = \sqrt{41}$

$x = 6.4031...$

$x = 6.4 \text{ cm (to 2 s.f.)}$

**Discussion** Does it matter which side is  $a$  and which is  $b$ ?

## Example 3

The sum of the interior angles of a polygon is 1620°. How many sides does the polygon have?

$(n - 2) \times 180^\circ = 1620^\circ$

Form an equation using the sum of interior angles.

$n - 2 = \frac{1620}{180}$

Divide both sides by 180.

$n - 2 = 9$

Add 2 to both sides.

$n = 11$

## Key point 4

When one side of a polygon is extended at a vertex:

- angle  $x$  is the interior angle
- angle  $y$  is the exterior angle.

interior angle + exterior angle = 180° (angles on a straight line add up to 180°)

## Key point 5

The sum of the exterior angles of a polygon is always 360°.

In a regular polygon all the angles are the same size, so exterior angle =  $\frac{360^\circ}{\text{number of sides}}$

## Sin and Cos ratio: side lengths

**Sin**  $\theta = \frac{\text{opposite side}}{\text{hypotenuse side}}$

**Cos**  $\theta = \frac{\text{adjacent side}}{\text{hypotenuse side}}$

**NOTE** The  $\sin(x)$  ratio is the same as the  $\cos(90-x)$  ratio

Substitute the values into the ratio formula

Equations might need rearranging to solve

## Tangent ratio: side lengths

$\tan \theta = \frac{\text{opposite side}}{\text{adjacent side}}$

Substitute the values into the tangent formula

$\tan 34^\circ = \frac{10}{x}$

Equations might need rearranging to solve

$x \times \tan 34^\circ = 10$

$x = \frac{10}{\tan 34^\circ} = 14.8 \text{ cm}$

## Hypotenuse, adjacent and opposite

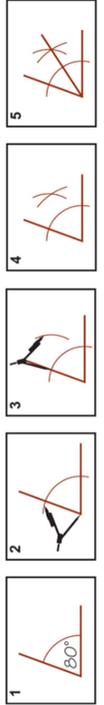
ONLY right-angled triangles are labeled in this way

Always opposite an acute angle. Useful to label second. Position depend upon the angle in use for the question.

Next to the angle in question. Often labelled last.

Always the longest side. Always opposite the right angle. Useful to label first.

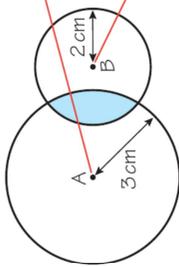
Draw an angle of 80°. Points equidistant from two lines lie on the angle bisector. Construct the **angle bisector**.



- 1 Draw an angle of 80° using a protractor.
- 2 Open your compasses and place the point at the vertex of the angle. Draw an arc that crosses both arms of the angle.
- 3 Keep the compasses open to the same distance. Move them to one of the points where the arc crosses an arm. Make an arc in the middle of the angle.
- 4 Do the same for where the arc crosses the other arm.
- 5 Join the vertex of the angle to the point where the two small arcs intersect. Don't rub out your construction marks. This line is the angle bisector.

A and B are two points 4 cm apart.

Shade the points that are less than 3 cm from A and less than 2 cm from B.



Draw a circle at A with radius 3 cm. All the points inside this circle are less than 3 cm from A.

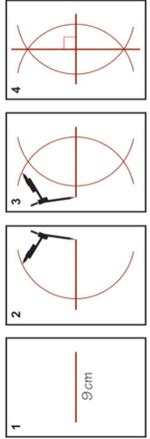
Draw a circle at B with radius 2 cm. All the points inside this circle are less than 2 cm from B.

Shade the region which satisfies both rules.

Pressure is a compound measure. It is the **force** in newtons applied over an **area** in cm<sup>2</sup> or m<sup>2</sup>. It is usually measured in newtons (N) per square metre (N/m<sup>2</sup>) or per square centimetre (N/cm<sup>2</sup>).

$$\text{Pressure} = \frac{\text{force}}{\text{area}} \text{ or } P = \frac{F}{A}$$

Draw a line 9 cm long. Construct its **perpendicular bisector**.



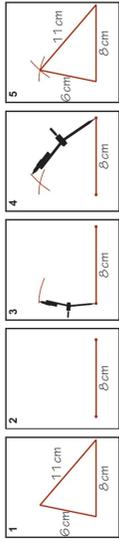
Points equidistant from two points lie on the perpendicular bisector

- 1 Use a ruler to draw the line.
- 2 Open your compasses to more than half the length of the line. Place the point on one end of the line and draw an arc above and below the other end of the line and draw a similar arc.
- 3 Keeping the compasses open to the same distance, move the point of the compasses to the other end of the line and draw a similar arc.
- 4 Join the points where the arcs intersect. This vertical line is the perpendicular bisector.

To **construct** means to draw accurately using a ruler and compasses.

**Example 6**

Construct a triangle with sides 11 cm, 8 cm and 6 cm.



- 1 Sketch the triangle first.
- 2 Draw the 8 cm line.
- 3 Open your compasses to 6 cm. Place the point at one end of the 8 cm line. Draw an arc.
- 4 Open your compasses to 11 cm. Draw another arc from the other end of the 8 cm line. Make sure your arcs are long enough to intersect.
- 5 Join the intersection of the arcs to each end of the 8 cm line. Don't rub out your construction marks.

**A locus** is the set of all points that obey a certain rule. Often a locus is a continuous path. A circle is the locus of a point that moves so that it is always a fixed distance from a fixed point.

**Key point 1**

- A **population** is the set of items that you are interested in.
- A **census** is a survey of the whole population.
- A **sample** is a smaller number of items from the population. A sample of at least 10% is considered to be a good-sized sample.

In order to reduce **bias**, a sample must – as far as possible – represent the whole population.

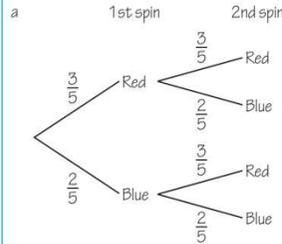
**Key point 5**

- A **distance–time graph** represents a journey. The vertical axis represents the *distance* from the starting point. The horizontal axis represents the *time* taken. On a distance–time graph, the gradient is the speed.

A **tree diagram** shows two or more events and their probabilities.

**Example 4**

- This fair five-sided spinner is spun twice.
- Draw a tree diagram to show the probabilities.
  - What is the probability of both spins landing on red?
  - What is the probability of landing on one red and one blue?



Write the probability on each branch of the diagram.

- $P(R, R) = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$   
Go along the branches for Red, Red. The 1st and 2nd spins are independent, so multiply the probabilities.
- $P(B, R) = \frac{1}{5} \times \frac{1}{5} = \frac{1}{25}$   
Go along the branches for Red, Blue and Blue, Red.
- $P(R, B \text{ or } B, R) = \frac{1}{25} + \frac{1}{25} = \frac{2}{25}$   
The outcomes Red, Blue and Blue, Red are mutually exclusive, so add the probabilities of their outcomes.

Pressure is a compound measure. It is the **force** in newtons applied over an **area** in cm<sup>2</sup> or m<sup>2</sup>. It is usually measured in newtons (N) per square metre (N/m<sup>2</sup>) or per square centimetre (N/cm<sup>2</sup>).

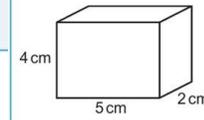
$$\text{Pressure} = \frac{\text{force}}{\text{area}} \text{ or } P = \frac{F}{A}$$

In a probability experiment a trial is repeated many times and the outcomes recorded. The relative frequency of an outcome is called the **experimental probability**.

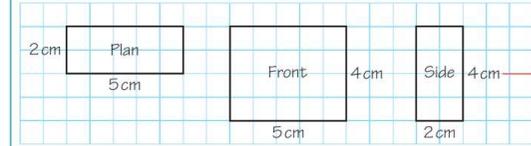
$$\text{Experimental probability of an outcome} = \frac{\text{frequency of outcome}}{\text{total number of trials}}$$

As the number of experiments increases, the experimental probability gets closer to the theoretical probability.

Draw the **plan, front elevation** and **side elevation** of this solid on squared paper.



The **plan** is the view from above the solid. The **front elevation** is the view of the front of the solid. The **side elevation** is the view of the side of the solid.



Use a ruler. Measure accurately. Label the lengths.

Josh uses this spinner for a game.

- What is the theoretical probability that the spinner will land on the letter B?
- Estimate how many times the spinner will land on the letter B.



Josh is going to spin this spinner 300 times.

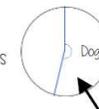
- $P(B) = \frac{2}{6} = \frac{1}{3}$   
Simplify fractions where possible.
- $\frac{1}{3} \times 300 = 100$   
Expected number of outcomes = number of trials  $\times$  probability

**Draw and interpret Pie Charts**

Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

There were 60 people asked in this survey (Total frequency)

$\frac{32}{60}$  "32 out of 60 people had a dog"  
This fraction of the 360 degrees represents dogs



**Multiple method**  
As 60 goes into 360 – 6 times  
Each frequency can be multiplied by 6 to find the degrees (proportion of 360)

$$\frac{32}{60} \times 360 = 192^\circ$$

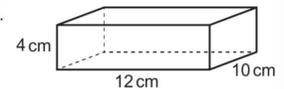
Use a protractor to draw This is 192°

**Comparing Pie Charts**  
You NEED the overall frequency to make any comparisons

In a **random** sample each item has the same chance of being chosen. To select a simple random sample, draw names from a hat or use a table of random numbers.

**Example 3**

The diagram shows a block of wood in the shape of a cuboid. The density of wood is 0.6 g/cm<sup>3</sup>.



Work out the mass of the block of wood.

- Density =  $\frac{\text{mass}}{\text{volume}}$   
First write down the formula you are going to use.
- Volume of block =  $l \times w \times h$   
You are given the density and are asked for the mass. So work out the volume in cm<sup>3</sup>.
- $0.6 = \frac{\text{mass}}{480}$   
Substitute values into the formula.
- $0.6 \times 480 = \frac{\text{mass}}{480} \times 480$   
Multiply both sides by 480.
- Mass = 288 g

**Simultaneous by Substitution**

1. **Rearrange** one of the equations into the form  $y = \dots$  or  $x = \dots$
2. **Substitute** the right-hand side of the rearranged equation into the other equation.
3. Expand and **solve** this equation.
4. **Substitute** the value into the  $y = \dots$  or  $x = \dots$  equation.
5. **Check** that the two values you get satisfy both of the original equations.

$$y - 2x = 3$$

$$3x + 4y = 1$$

Rearrange:  $y - 2x = 3 \rightarrow y = 2x + 3$

Substitute:  $3x + 4(2x + 3) = 1$

Solve:  $3x + 8x + 12 = 1$   
 $11x = -11$   
 $x = -1$

Substitute:  $y = 2 \times -1 + 3$   
 $y = 1$

Solution:  $x = -1, y = 1$

**Simultaneous by Elimination**

1. **Balance** the coefficients of one of the variables.
2. **Eliminate** this variable by adding or subtracting the equations (**Same Sign Subtract, Different Sign Add**)
3. **Solve** the linear equation you get using the other variable.
4. **Substitute** the value you found back into one of the previous equations.
5. **Solve** the equation you get.
6. **Check** that the two values you get satisfy both of the original equations.

$$5x + 2y = 9$$

$$10x + 3y = 16$$

Multiply the first equation by 2.

$$10x + 4y = 18$$

$$10x + 3y = 16$$

Same Sign Subtract (+10x on both)

$$y = 2$$

Substitute  $y = 2$  in to equation.

$$5x + 2 \times 2 = 9$$

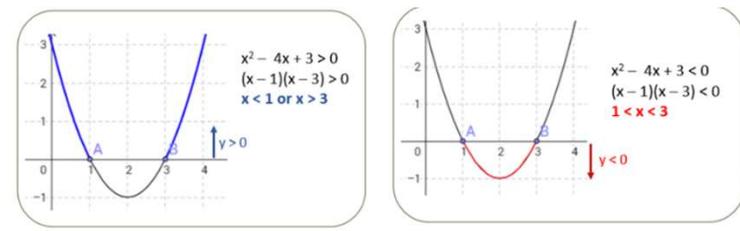
$$5x + 4 = 9$$

$$5x = 5$$

$$x = 1$$

Solution:  $x = 1, y = 2$

**Quadratic Inequalities**

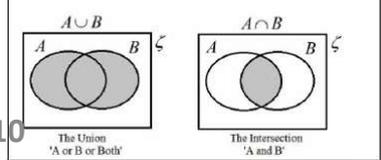


**Venn Diagrams**

When two events, A and B, are <b>independent</b> :	What is the probability of rolling a 4 and flipping a Tails?
$P(A \text{ and } B) = P(A) \times P(B)$	$P(4 \text{ and Tails}) = P(4) \times P(\text{Tails})$ $= \frac{1}{6} \times \frac{1}{2} = \frac{1}{12}$
When two events, A and B, are <b>mutually exclusive</b> :	What is the probability of rolling a 2 or rolling a 5?
$P(A \text{ or } B) = P(A) + P(B)$	$P(2 \text{ or } 5) = P(2) + P(5)$ $= \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

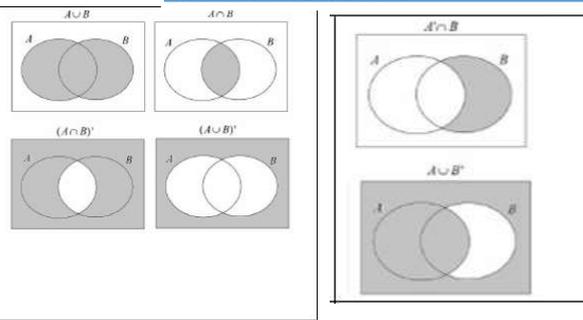
A Venn Diagram shows the **relationship between a group of different things** and how they overlap.

You may be asked to shade Venn Diagrams as shown below and to the right.



**Probability Notation**

$P(A)$  refers to the probability that event A will occur.  
 $P(A')$  refers to the probability that event A will not occur.  
 $P(A \cup B)$  refers to the probability that event A or Event B or both will occur.  
 $P(A \cap B)$  refers to the probability that both events A and B will occur

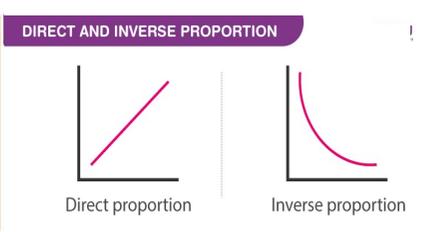


The outcome of a previous event does not influence/affect the outcome of a second event. (Independent Events)

The outcome of a previous event does influence/affect the outcome of a second event. (Dependent Events)

Variable	A <b>symbol</b> , usually a <b>letter</b> , which represents a <b>number</b> which is usually unknown.
Coefficient	A <b>number</b> used to <b>multiply a variable</b> . It is the number that comes before/in front of a letter.

<b>Direct proportion</b>	<b>Inverse proportion</b>
$y = kx$	$y = \frac{k}{x}$
k is a constant	k is a constant



**Proportionality**

**y is proportional to the square of x. If y = 18 when x = 3, what is:**

- a) y when x = 5  
 b) x when y = 98

**Step 1: find k**

$$y \propto x^2$$

$$y = kx^2$$

$$18 = k \times 3^2$$

$$18 = 9k$$

$$k = 2$$

a)  $y = 2x^2$

Sub in  $x = 5$

$$y = 2 \times 5^2$$

$$y = 2 \times 25$$

$$y = 50$$

b)  $y = 2x^2$

Sub in  $y = 98$

$$98 = 2x^2$$

$$49 = x^2$$

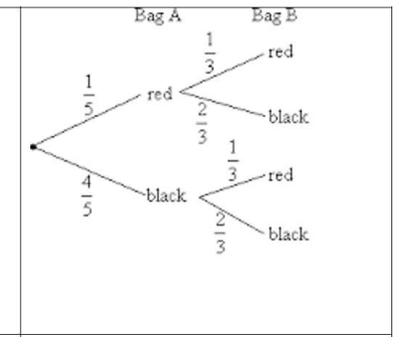
$$x = 7$$

**Tree Diagrams**

Tree diagrams show **all the possible outcomes** of an event and calculate their probabilities.

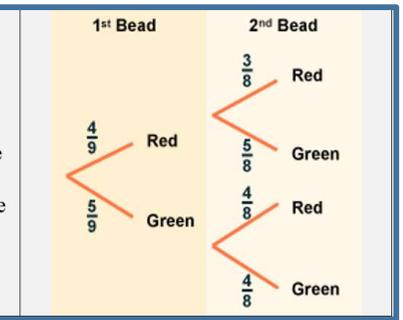
**All branches must add up to 1 when adding downwards.**  
 This is because the **probability of something not happening is 1 minus the probability that it does happen.**

**Multiply going across** a tree diagram.  
**Add going down** a tree diagram.



The probability of an event A happening, **given that** event B has already happened.

With conditional probability, check if the numbers on the second branches of a tree diagram changes. For example, if you have 4 red beads in a bag of 9 beads and pick a red bead on the first pick, then there will be 3 red beads left out of 8 beads on the second pick.





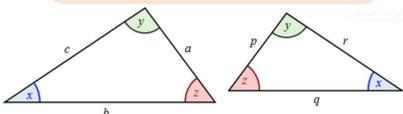
Shapes are **congruent** if they are identical - same shape and same size.

Shapes can be rotated or reflected but still be **congruent**.

Similar Triangles

- Same shape, but not necessarily the same size.
- Corresponding angles are equal.
- Corresponding sides are in the same ratio.

$$\frac{a}{p} = \frac{b}{q} = \frac{c}{r}$$



To test for similar triangles:

- **AA** - If 2 corresponding angles are equal.
- **SSS** - If 3 corresponding sides are in the same ratio.
- **SAS** - Ratio of 2 pairs of corresponding sides are equal and their included angles are equal.

Similar Shapes scale factors

Length  $\rightarrow \times k$   
Area  $\rightarrow \times k^2$   
Volume  $\rightarrow \times k^3$

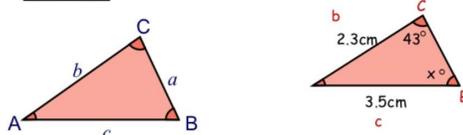
3D Pythagoras

3D Trigonometry

Calculate the angle  $\angle BHF$

Handwritten calculations:  
 $3^2 + 4^2 = FH^2$   
 $9 + 16 = FH^2$   
 $25 = FH^2$   
 $5 = FH$   
 $\tan \theta = \frac{opposite}{adjacent} = \frac{3.5}{5} = 0.7$   
 $\tan^{-1} 0.7 = 34.99^\circ$

Sine Rule



Use this when finding a length

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

or

Use this when finding an angle

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin B}{b} = \frac{\sin C}{c}$$

$$\frac{\sin x}{2.3} = \frac{\sin 43}{3.5}$$

$$\sin x = \frac{\sin 43}{3.5} \times 2.3$$

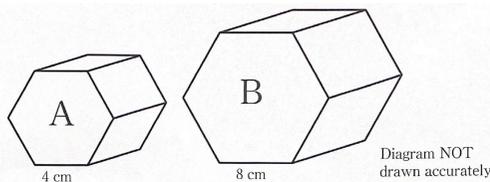
$$\sin x = 0.44817 \dots$$

$$x = 0.44817 \dots \sin^{-1}$$

$$x = 26.6 \text{ (1dp)}$$

Similar Shapes

The diagram shows two similar solids, A and B.



Solid A has a volume of  $160 \text{ cm}^3$  <sup>volume</sup>

(a) Work out the volume of solid B. [2]

Handwritten solution:  
 $A \quad k = 2 \quad B$   
 $L \quad 4 \quad \times 2 \rightarrow 8$   
 $A \quad 140 \text{ cm}^2 \times 4 \rightarrow 560$   
 $V \quad 160 \times \frac{8}{4} \times \frac{8}{4} \times \frac{8}{4} = 1280 \text{ cm}^3$   
 $160 \times 8 = 1280$

(a) Work out the total surface area of solid A. [2]

Handwritten solution:  
 $560 \div 4 = 140$

Find missing lengths by identifying right angled triangles.

You will often have to find a missing length you are not asked for before finding the missing length you are asked for.

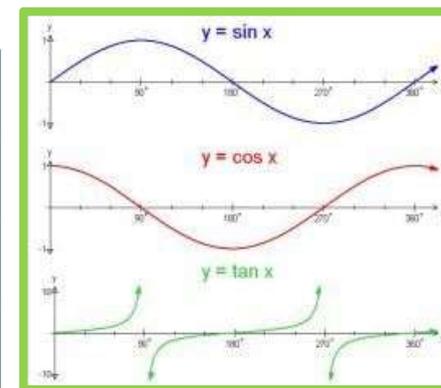
Can a pencil that is 20cm long fit in a pencil tin with dimensions 12cm, 13cm and 9cm? The pencil tin is in the shape of a cuboid.

Hypotenuse of the base =  
 $\sqrt{12^2 + 13^2} = 17.7$

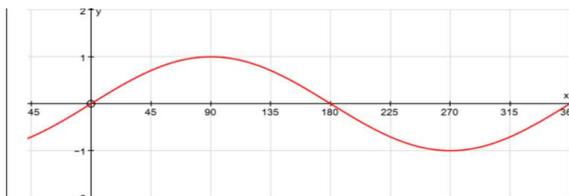
Diagonal of cuboid =  $\sqrt{17.7^2 + 9^2} = 19.8 \text{ cm}$   
 No, the pencil cannot fit.

Exact Trig Values

	$0^\circ$	$30^\circ$	$45^\circ$	$60^\circ$	$90^\circ$
sin	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tan	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-

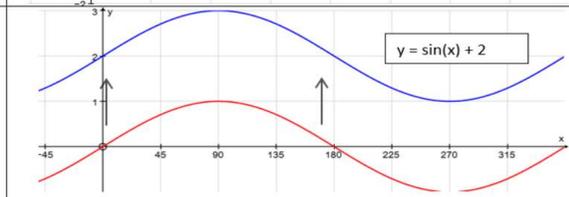


Graph of  $y = \sin(x)$  for comparison



Graph of  $y = \sin(x) + a$

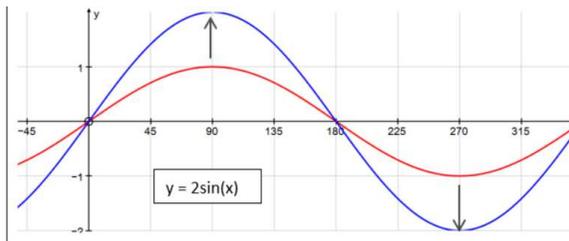
The graph moves up the y axis by the value of 'a'. The x coordinates stay the same and the y coordinates become y + a. Graph of  $y = \sin(x) + 2$



The graph moves up the y axis by 2 as 2 is added to each y coordinate.

Graph of  $y = a \sin(x)$

The graph is stretched in the direction of the y axis. This means that the x coordinates stay the same but the y coordinates are multiplied by 'a'

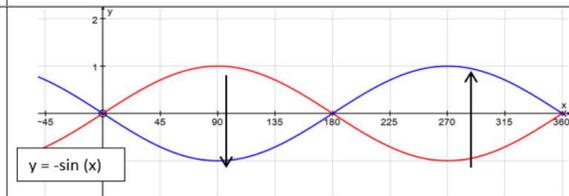


Graph of  $y = 2 \sin(x)$

So when  $x = 90$   $y = 2 \times \sin(90) = 2$   
 when  $x = 270$   $y = 2 \times \sin(270) = -2$

Graph of  $y = -\sin(x)$

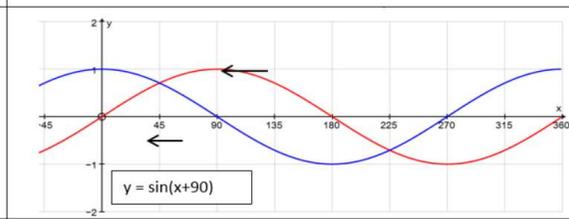
The graph is reflected in the x axis. The x coordinates stay the same but the y coordinates become negative.



So when  $x = 90$   $y = -\sin(90) = -1$   
 and when  $x = 270$   $y = -\sin(270) = 1$

Graph of  $y = \sin(x + a)$

The graph moves 'a' to the left. The x coordinates becomes (x - a) and the y coordinates stay the same. For  $y = \sin(x+90)$  The x coordinate changes from  $x=90$  to  $x=0$  and y remains  $y=1$   $x=360$  changes to  $x=270$  and y remains  $y=0$



Trigonometric graphs

## Infection and Response Knowledge Organiser – Foundation and Higher

## Science: Biology

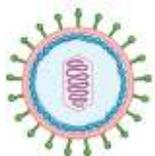
**Communicable Disease**

Pathogens are microorganisms that enter the body and cause communicable disease (infectious). Plants and animals can be infected by them.

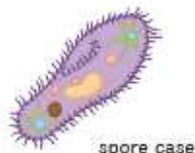
**Bacteria** are small cells that can reproduce very quickly in the body. They produce toxins that make you feel ill, damaging your cells and tissues.



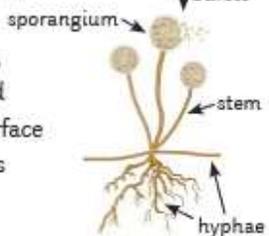
**Viruses** are much smaller than bacteria; they can also reproduce quickly in the body. Viruses live inside your cell where they replicate. They then burst out of the cell, releasing new viruses.



**Protists** are eukaryotes (multicellular). Some are parasites which live on or inside other organisms, often carried by a vector.



**Fungi** are sometimes single celled, others have hyphae that grow and penetrate human skin and the surface of plants. They can produce spores which can spread to other plants.

**How Pathogens Are Spread**

Pathogens can be spread in many ways, for example:

**Water** – by drinking dirty water, e.g. cholera.

**Air** – carried by air and breathed in, e.g. influenza.

**Direct contact** – touching contaminated surfaces including the skin, e.g. athlete's foot.

**Viral Diseases**

**Measles** is spread by droplets of liquid from sneezes and coughs etc., symptoms include a red rash on the skin and a fever. Measles can be serious or even fatal, it can lead to pneumonia. Most people are vaccinated against measles when they are very young.

**HIV** is spread by sexual contact or exchanging body fluids. HIV can be controlled by antiviral drugs; this stops the viruses replicating. The virus attacks the cells in the immune system. If the immune system is badly damaged, the body cannot cope with other infections. This is the late stage and is called AIDS.

**Tobacco mosaic virus** affects plants, parts of the leaves become discoloured. This means plants cannot carry out photosynthesis; this will affect the plants growth.

**Fungal and Protist Diseases****Fungal**

**Rose black spot** shows as black spots on the leaves of the plant, this means less photosynthesis occurs. As a result, the plant does not grow as well. It is spread by the wind or the water. They can be treated by using fungicides and taking the leaves off the infected plant.

**Protists**

**Malaria** is caused by a protist, mosquitoes are the vectors. They become infected when they feed on an infected animal. The protist is inserted into the blood vessel. Malaria can cause fever, it can also be fatal.

**Bacterial Diseases**

**Salmonella** bacteria causes food poisoning. Symptoms include fever, stomach cramps, vomiting and diarrhoea. The symptoms are caused by the toxins produced by the bacteria. Food contaminated with salmonella can give you food poisoning. Most poultry in the UK will have had a vaccination against salmonella.

**Gonorrhoea** is a sexually transmitted bacterial disease, passed on by sexual contact. Symptoms include pain when urinating and thick yellow/green discharge from the vagina or penis. To prevent the spread, people should be treated with antibiotics and use a condom.

**How to prevent the spread:**

**Being hygienic** –

washing hands thoroughly.

**Destroying vectors** –

killing vectors by using insecticides or destroying their habitat.

**Isolation** –

isolating an infected person will prevent the spread.

**Vaccination** –

people cannot develop the infection and then pass it on.



# Infection and Response Knowledge Organiser – Foundation and Higher

# Science: Biology

## Fighting Diseases

### Defence System

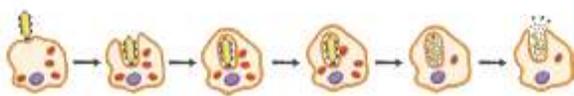
1. The skin acts as a barrier to pathogens.
2. Hairs and mucus in your nose trap particles.
3. The trachea and bronchi secrete mucus to trap pathogens. They also have cilia which move backwards and forwards to transport the mucus towards the throat. This traps any pathogens and the mucus is usually swallowed.
4. The stomach contains hydrochloric acid to kill any pathogens that enter the body via the mouth.

### The Immune System

This kills any pathogens that enter the body.

White blood cells:

- **Phagocytosis** is when white blood cells engulf pathogens and then digest them.
- They produce **antitoxins** to neutralise the toxins.
- They also produce **antibodies**. Pathogens have **antigens** on their surface, antibodies produced by the white blood cells lock on to the antigen on the outside of the pathogen. White blood cells can then destroy the pathogens. Antibodies are specific to one antigen and will only work on that pathogen.



## Vaccinations

Vaccinations have been developed to protect us from future infections. A vaccination involves an injection of a **dead or weakened** version of the pathogen. They carry antigens which cause your body to produce antibodies which will attack the pathogen. If you are infected again, the white blood cells can produce antibodies quickly.



Pros	Cons
Helps to control communicable diseases that used to be very common.	They don't always work.
Epidemics can be prevented.	Some people can have a bad reaction to a vaccine – however, that is very rare.

## Fighting Disease – Drugs

**Painkillers** relieve the pain and symptoms, but do not tackle the cause.



**Antibiotics** kill the bacteria causing the problem, but do not work on viruses. Viruses are very difficult to kill because they live inside the body cells.



## Developing Drugs

There are three main stages in drug testing:

Pre-clinical testing:

1. Drugs are tested on human cells and tissues.
2. Testing carried out on living animals.

Clinical testing:

3. Tested on healthy human volunteers in clinical trials. Starts with a very low dose, then tested on people with the illness to find the optimum dose.

**Placebo** is a substance that is like the drug, but does not do anything.

**Placebo effect** is when the patient thinks the treatment will work even though their treatment isn't doing anything.

**Blind trial** is when the patient does not know whether they are getting the drug or the placebo.

**Double-blind trial** is when both the doctor and the patient do not know whether they are getting the drug.

## Drugs from Plants

Chemicals produced by plants to defend themselves can be used to treat human diseases or help with symptoms.

Drug	Plant/Microorganism
aspirin	willow
digitalis	foxglove
penicillin	mould - penicillium

New drugs are now made by chemists, who work for the pharmaceutical industry, in laboratories.

## Key Vocabulary

- antibodies
- antigens
- antitoxins
- bacteria
- blind trial
- double-blind
- fungus
- microorganism
- phagocytosis
- placebo
- protist
- toxins
- vaccination
- vector
- virus

# AQA GCSE Chemistry (Combined Science) Unit 6: The Rate and Extent of Chemical Change

## Calculating Rates of Reactions

Reactions happen at **varying rates**. For example, a firework exploding is a fast reaction whereas a piece of iron rusting would take place over a longer period of time.

The **rate of a chemical reaction** tells us how quickly a **product is formed** or how quickly a **reactant is used up**.

For a chemical reaction to occur, the reactant particles must collide with enough energy. Those collisions that produce a chemical reaction are called **successful collisions**.

$$\text{mean rate of reaction} = \frac{\text{quantity of reactant used}}{\text{time taken}}$$

$$\text{mean rate of reaction} = \frac{\text{quantity of product formed}}{\text{time taken}}$$

## Measuring the Mass of a Reaction Mixture

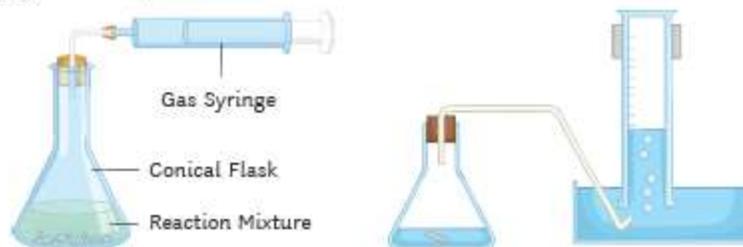
The changing mass of a reaction mixture can be measured during a reaction. This method is particularly useful when gases, such as carbon dioxide, are given off. **Gas escapes during the reaction and the mass of the reaction mixture decreases.** The mass can be measured at regular time intervals.



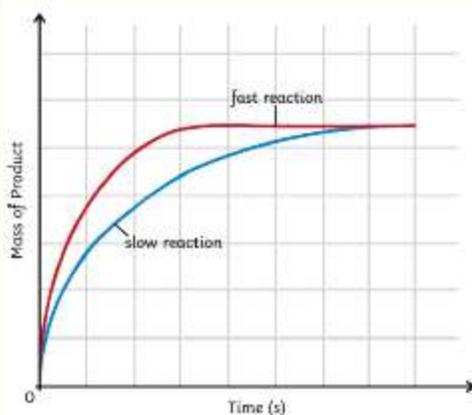
units = g/s or g/min

## Measuring the Volume of a Reaction Mixture

The changing volume of a reaction mixture can be measured during a reaction. This method is particularly useful when gases, such as carbon dioxide, are given off. The gas can be collected and its volume measured at regular time intervals. Different types of measuring equipment can be used to collect the gas such as a gas syringe, measuring cylinder or upside-down burette.



units = cm<sup>3</sup>/s or cm<sup>3</sup>/min



Graphs are a useful way to analyse the results from a rate of reaction investigation. The graph above shows two lines, one red and one blue.

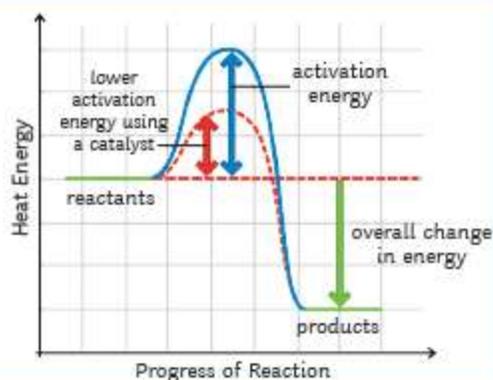
The red line represents a fast reaction and the blue line a slow reaction. We know the fast reaction occurs at a much faster rate as the line is steep. The fast reaction finishes before the slow reaction as the line plateaus sooner.

## Factors Affecting the Rate of a Chemical Reaction

- concentration and pressure
- catalyst
- surface area
- temperature

The rate of a chemical reaction will be increased if there are more frequent successful collisions between reactant particles.

## Catalyst



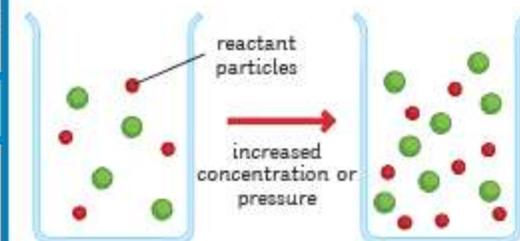
A catalyst is a **substance** that speeds up a chemical reaction without getting used up itself. Catalysts are able to offer an **alternative pathway** at a **lower activation energy**.

**Biological catalysts** are called **enzymes**.

When a catalyst is used in a chemical reaction (not all reactions have a catalyst that is suitable to use), the **frequency of collisions is unchanged**. More **particles** are able to react. The particles have **energy greater than that of the activation energy**. Consequently, there is an **increase in the rate of successful collisions**.

## Concentration and Pressure

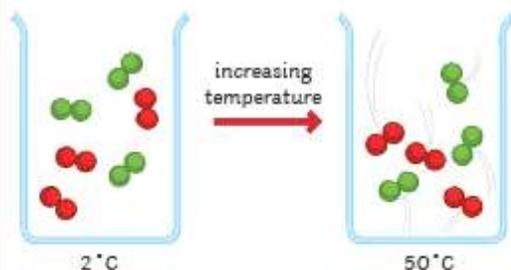
If the number of reactant particles in a given space is **doubled**, there will be more frequent successful collisions between reactant particles, therefore, **increasing the rate of reaction**.



## AQA GCSE Chemistry (Combined Science) Unit 6: The Rate and Extent of Chemical Change

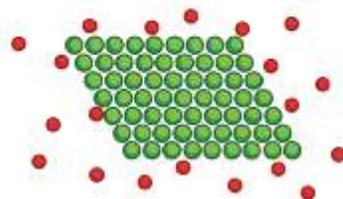
## Temperature

When the temperature of the reaction mixture is increased, the reactant particles **gain kinetic energy** and move much more quickly. This results in **more frequent successful collisions** between the reactant particles, therefore, **increasing the rate of the reaction**.



## Surface Area

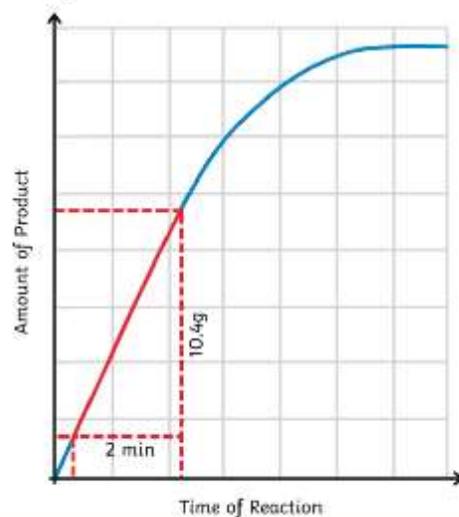
**Large lumps** of a solid have a **small surface area to volume ratio**. If the solid is broken up into smaller lumps or crushed into a powder, this will increase the surface area to volume ratio.



A larger area of the solid is now exposed to other reactant particles. This increases the frequency of successful collisions thus increasing the rate of reaction.

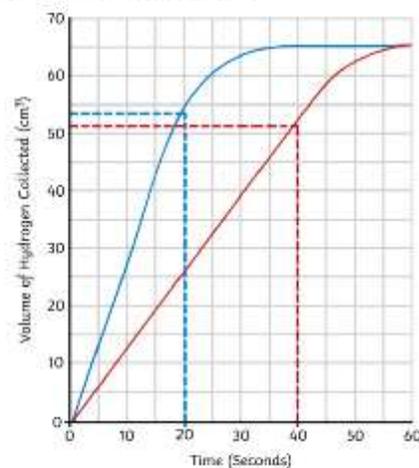
Calculating Gradient (Higher Tier Only)  $\text{gradient} = \frac{y}{x}$

On the graph, draw construction lines on the part of the graph that has a straight line. Measure the values of x and y.



In the graph below, the gradient of the first line is much steeper than the second line. This indicates that a faster reaction is taking place. Remember, the steeper the line, the faster the reaction.

To calculate the reaction rate at a specific time period, construction lines must first be drawn on the straightest part of the graph.



For the first line, what is the rate of reaction at 20 seconds?

$$54 \div 20 = 2.7 \text{ cm}^3/\text{s}$$

For the second line, what is the rate of reaction at 40 seconds?

$$52 \div 40 = 1.3 \text{ cm}^3/\text{s}$$

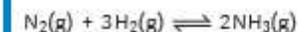
## Dynamic Equilibrium

In a closed system (this means nothing can get in or out), a reversible reaction can reach **dynamic equilibrium**. This is where the **forward and reverse reactions are occurring at the same rate** and the **concentrations of all the substances that are reacting remain constant**.

## Changing Conditions and the Effect on the Position of Equilibrium (Higher Tier Only)

The reaction between nitrogen and hydrogen to make ammonia is an industrial process called the Haber process. It requires a high temperature, high pressure and an iron catalyst.

The symbol equation for the reaction is as follows:



According to **Le Chatelier's Principle**, the position of equilibrium can be altered by changing the conditions of the reaction i.e. the pressure, concentration and/or the temperature. The **position of the equilibrium** will shift to **counteract** any changes made.

Increasing the **temperature** of the reaction in the forward direction (exothermic) will result in the equilibrium shifting in favour of the reverse direction (endothermic) to reduce the temperature.

From the equation, it is clear that on the **left-hand side**, there are **four molecules** and on the **right-hand side**, there are **two molecules**. If the pressure in the system were **increased**, the equilibrium position **would shift to the right** as there are fewer molecules. If the pressure in the system were **decreased**, the equilibrium position **would shift to the left** as there are a larger number of molecules.

If the **concentration** of one of the reactants were **increased**, then the equilibrium position would move in **favour of the products**. This would result in more product being produced. If the concentration of the **products were decreased**, equilibrium would shift to **favour the products**. More reactants would react until equilibrium is reached.

## AQA GCSE Chemistry (Combined Science) Unit 6: The Rate and Extent of Chemical Change

## Reversible Reactions

A reversible reaction is one in which the **reactants form products**. The products are then able to react together to **reform the reactants**.

For example:

A reacts with B to form C and D.

C and D are able to react to form A and B.

The equation would be as follows (where the **double arrow symbol** represents a **reversible reaction** is taking place):



The **forward reaction** goes to the **left** and the **backwards reaction** goes to the **right**. For example, if the forward reaction is **exothermic** then the backward reaction will be **endothermic**. The amount of energy that is transferred is the same for both the forward and reverse reaction.

**Hydrated copper sulfate** is a blue substance. We say that the copper sulfate is hydrated as it **contains water**. The copper sulfate is heated and the water evaporates leaving a white substance known as **anhydrous copper sulfate**. Anhydrous meaning **no water**.

The word equation for the reaction is as follows:

hydrated copper sulfate  $\rightleftharpoons$  anhydrous copper sulfate + water



The reaction can be reversed when water is added to the anhydrous copper sulfate.

## Required Practical 5: Measuring the Production of a Gas

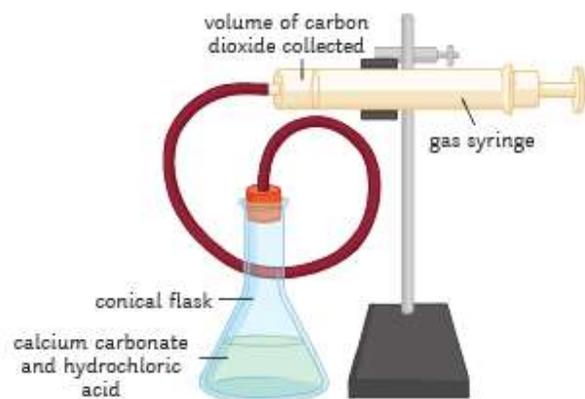
This method outlines one way to carry out an investigation to collect a gas from a chemical reaction.

The practical involves changing the concentration of hydrochloric acid and measuring the volume of carbon dioxide gas produced when the acid reacts with calcium carbonate.

The word equation for the reaction is as follows:

calcium carbonate + hydrochloric acid  $\rightarrow$  calcium chloride + water + carbon dioxide

The symbol equation for the reaction is:



## Method

**Step 1** – Clamp a gas syringe to a retort stand using a boss and clamp. Ensure the syringe is a quarter of the way from the top of the stand. Place the delivery tube to the end of the gas syringe.

**Step 2** – Measure out 50ml of hydrochloric acid using a measuring cylinder and pour into a conical flask.

**Step 3** – Using a top pan balance, measure out 0.5g of powdered calcium carbonate and place in the conical flask.

**Step 4** – Immediately connect the bung and delivery tube to the conical flask. Start the stopwatch.

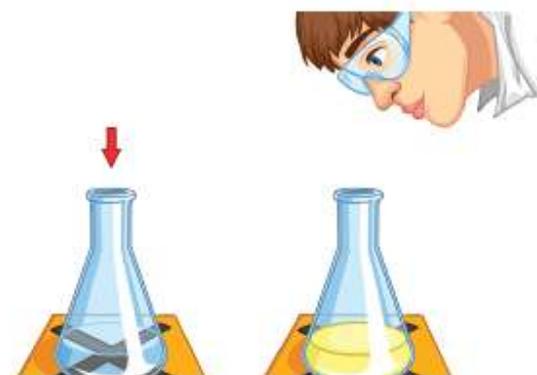
**Step 5** – Record the volume of carbon dioxide gas produced every 10 seconds.

**Step 6** – When the reaction has finished and there are no more bubbles of gas being produced, clean the equipment and repeat using four other different concentrations of hydrochloric acid.

When analysing the results from the practical investigation, plot a graph of Time (s) against Volume of Gas Produced ( $\text{cm}^3$ ). Draw a curve of best fit through the points. A graph should be plotted for each concentration of acid.

Calculate the mean rate of reaction ( $\text{cm}^3/\text{s}$ ) for each concentration of acid used. This can be calculated by dividing the total mass of gas produced ( $\text{cm}^3$ ) by the reaction time (s).

## Required Practical 5: Investigating a Change in Colour

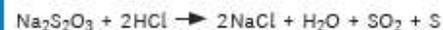


This method outlines one way to carry out an investigation into the effect of increased temperature on the rate of a reaction.

The word equation for this reaction is as follows:

sodium thiosulfate + hydrochloric acid  $\rightarrow$  sodium chloride + water + sulfur dioxide + sulfur

The symbol equation for this reaction is:



The reaction between sodium thiosulfate and hydrochloric acid produces a **precipitate**. Sulfur is responsible for the formation of the precipitate. A precipitate is a **solid** that is formed in a solution. It is the formation of this precipitate that causes the reaction mixture to become **cloudy**; the cloudiness is a way to measure the **reaction time**.

## AQA GCSE Chemistry (Combined) Unit 5 Energy Changes Knowledge Organiser

### Exothermic and Endothermic Reactions

When a chemical reaction takes place, **energy** is involved. Energy is transferred when chemical **bonds are broken** and when new **bonds are made**.

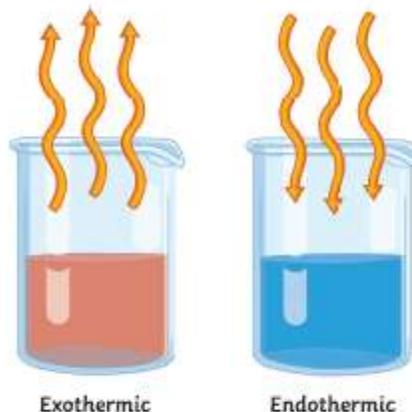
**Exothermic reactions** are those which involve the transfer of energy **from the reacting chemicals** to the surroundings. During a practical investigation, an exothermic reaction would show an **increase in temperature** as the reaction takes place.

Examples of exothermic reactions include **combustion, respiration and neutralisation** reactions. Hand-warmers and self-heating cans are examples of everyday exothermic reactions.

**Endothermic reactions** are those which involve the transfer of energy **from the surroundings** to the reacting chemicals. During a practical investigation, an endothermic reaction would show a **decrease in temperature** as the reaction takes place.

Examples of endothermic reactions include the **thermal decomposition** of calcium carbonate.

Eating **sherbet** is an everyday example of an endothermic reaction. When the sherbet dissolves in the saliva in your mouth, it produces a cooling effect. Another example is **instant ice packs** that are used to treat sporting injuries.



**Activation Energy** – the minimum amount of energy required for a chemical reaction to take place.

**Catalysts** – increase the rate of a reaction. Catalysts provide an alternative pathway for a chemical reaction to take place by **lowering** the activation energy.

### Bond Making and Bond Breaking

In an **endothermic** reaction, energy is needed to break chemical bonds. The **energy change ( $\Delta H$ )** in an endothermic reaction is **positive**.

You may also find, in some textbooks,  $\Delta H$  referred to as the **enthalpy change**.

In an **exothermic** reaction, energy is needed to form chemical bonds. The **energy change ( $\Delta H$ )** in an exothermic reaction is **negative**.

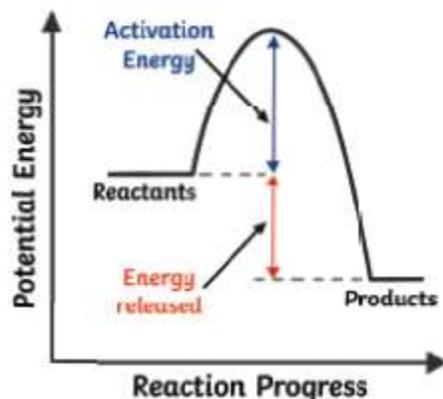
Bond energies are measured in **kJ/mol**.

### Reaction Profiles – Exothermic

Energy level diagrams show us what is happening in a particular chemical reaction. The diagram shows us the **difference in energy** between the reactants and the products.

In an exothermic reaction, the **reactants** are at a **higher energy level** than the products.

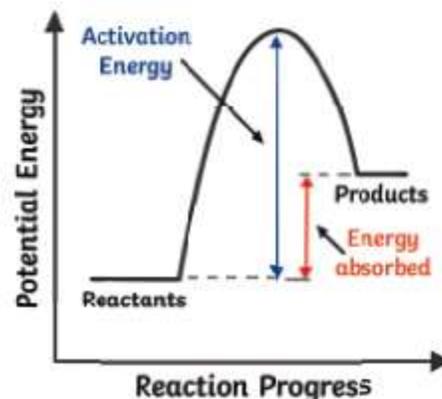
In an **exothermic** reaction, the difference in energy is **released** to the surroundings and so the **temperature** of the surroundings **increases**.



### Reaction Profiles – Endothermic

In an **endothermic** reaction, the **reactants** are at a **lower energy level** than the products.

In an **endothermic** reaction, the difference in energy is **absorbed** from the surroundings and so the **temperature** of the surroundings **decreases**.



**Calculations Using Bond Energies (Higher Tier Only)**

Bond energies are used to calculate the change in energy of a chemical reaction.

Calculate the change in energy for the reaction:  $2\text{H}_2\text{O}_2 \longrightarrow 2\text{H}_2\text{O} + \text{O}_2$

The first step is to write the symbol equation for the reaction. Once you have done this, work out the bonds that are breaking and the ones that are being made.



Bond	Bond Energy kJ/mol
H-O	464
O-O	146
O=O	498

On the **left-hand side** of the equation, the **bonds are breaking**.

There are two **O-H** bonds and one **O-O** bond.

$$\text{So } 464 + 146 + 464 = 1074$$

There are two moles of  $\text{H}_2\text{O}_2$  therefore the answer needs to be multiplied by two.

$$\text{So } 1074 \times 2 = 2148$$

On the **right-hand side** of the equation, the **bonds are made**.

There are two **H-O** bonds

$$\text{So } 464 + 464 = 928$$

Two moles of  $\text{H}_2\text{O}$  are made therefore the answer needs to be multiplied by two.

$$\text{So } 928 \times 2 = 1856$$

There is also one **O=O** bond with a bond energy of 498

$$\text{So } 1856 + 498 = 2354$$

$$\Delta H = \text{sum (bonds broken)} - \text{sum (bonds made)}$$

$$\Delta H = 2148 - 2354 = -206 \text{ kJ/mol}$$

The reaction is exothermic as  $\Delta H$  is negative.

**Required Practical****Aim**

To investigate the variables that affect temperature changes in reacting solutions, e.g. acid plus metals, acid plus carbonates, neutralisations and displacement of metals.

**Equipment**

- polystyrene cup
- measuring cylinder
- thermometer
- 250cm<sup>3</sup> glass beaker
- measuring cylinder
- top pan balance

**Method**

1. Gather the equipment.
2. Place the polystyrene cup inside the beaker. This will prevent the cup from falling over.
3. Using a measuring cylinder, measure out 30cm<sup>3</sup> of the acid. Different acids such as hydrochloric or sulfuric acid may be used. Pour this into the polystyrene cup.
4. Record the temperature of the acid using a thermometer.
5. Using a top pan balance, measure out an appropriate amount of the solid (for example, 10g) or use one strip of a metal such as magnesium.
6. Add the solid to the acid and record the temperature. You may choose to record the temperature of the acid and metal every minute for 10 minutes.



## AQA Combined Science: Physics Topic 3 Particle Model of Matter

## Required Practical

## Measuring the density of a regularly shaped object:

- Measure the mass using a balance.
- Measure the length, width and height using a ruler.
- Calculate the volume.
- Use the density ( $\rho = m/V$ ) equation to calculate density.

## Measuring the density of an irregularly-shaped object:

- Measure the mass using a balance.
- Fill a eureka can with water.
- Place the object in the water - the water displaced by the object will transfer into a measuring cylinder.
- Measure the volume of the water. This equals the volume of the object.
- Use the density ( $\rho = m/V$ ) equation to calculate density.



## Density

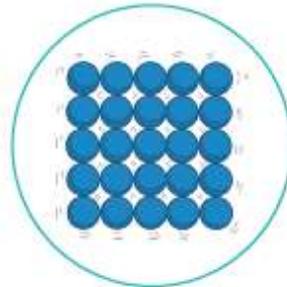
Density is a measure of how much mass there is in a given space.

$$\text{Density (kg/m}^3\text{)} = \text{mass (kg)} \div \text{volume (m}^3\text{)}$$

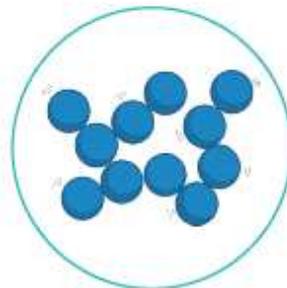
A more dense material will have more particles in the same volume when compared to a less dense material.

## Particles

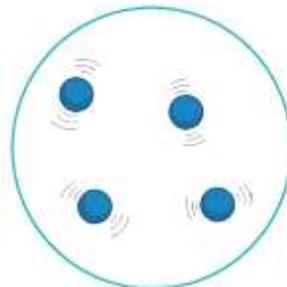
**Solids** have strong forces of attraction. They are held together very closely in a fixed, regular arrangement. The particles do not have much energy and can only vibrate.



**Liquids** have weaker forces of attraction. They are close together, but can move past each other. They form irregular arrangements. They have more energy than particles in a solid.



**Gases** have almost no forces of attraction between the particles. They have the most energy and are free to move in random directions.



## Particles

Gas particles can move around freely and will collide with other particles and the walls of the container. This is the pressure of the gas.

If the temperature of the gas increases, then the pressure will also increase. The hotter the temperature, the more kinetic energy the gas particles have. They move faster, colliding with the sides of the container more often.



## Density

The density of an object is  $8050\text{kg/m}^3$  and it has a volume of  $3.4\text{m}^3$  - what is its mass in kg?

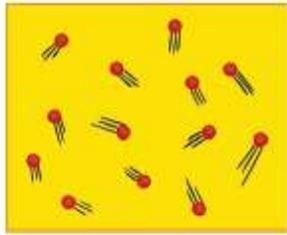
$$8050 = \text{mass} \div 3.4$$

$$8050 \times 3.4 = \text{mass}$$

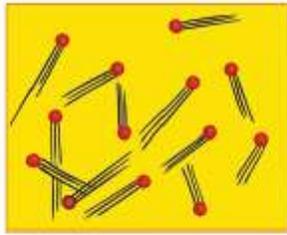
$$27\,370\text{kg}$$

### Internal Energy

Particles within a system have kinetic energy when they vibrate or move around. The particles also have a potential energy store. The total internal energy of a system is the kinetic and potential energy stores.



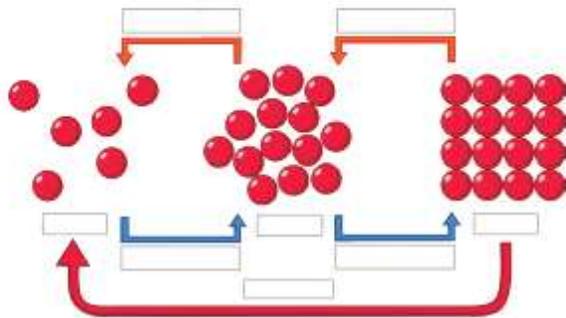
Low Temperature



High Temperature

If the system is heated, the particles will gain more kinetic energy, so increasing the internal energy.

### Changing State

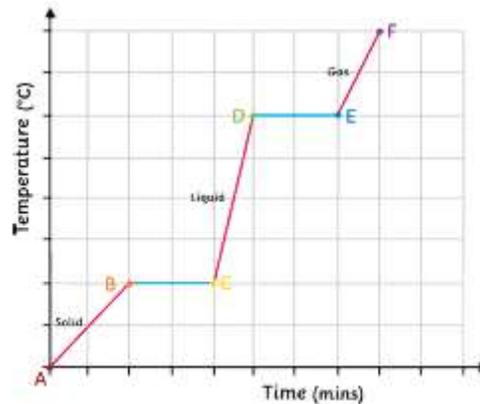


If a system gains more energy, it can lead to a change in temperature or change in state. If the system is heated enough, then there will be enough energy to break bonds.

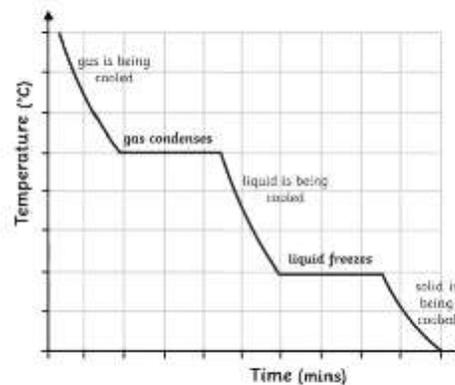
When something changes state, there is no chemical change, only physical. No new substance is formed. The substance will change back to its original form. The number of particles does not change and mass is conserved.

### Specific Latent Heat

Energy is being put in during melting and boiling. This increases the amount of internal energy. The energy is being used to break the bonds, so the temperature does not increase. This is shown by the parts of the graph that are flat.



When a substance is condensing or freezing, the energy put in is used to form the bonds. This releases energy. The internal energy decreases, but the temperature does not go down.



The energy needed to change the state of a substance is called the latent heat.

Specific latent heat is the amount of energy needed to change 1kg of a substance from one state to another without changing the temperature. Specific latent heat will be different for different materials.

- solid → liquid - specific latent heat of fusion
- liquid → gas - specific latent heat of vaporisation

### Specific Latent Heat Equation

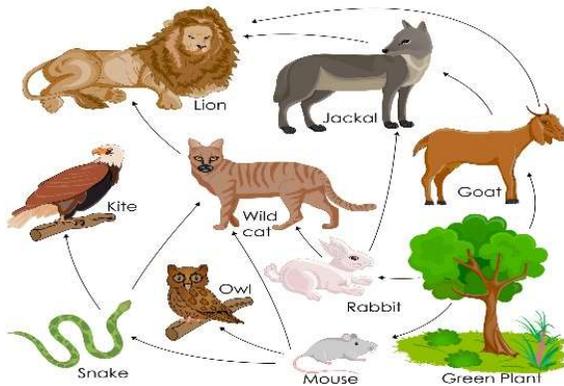
The amount of energy needed/released when a substance of mass changes state.

$$\text{energy (E)} = \text{mass (m)} \times \text{specific latent heat (L)}$$

$$E = mL$$



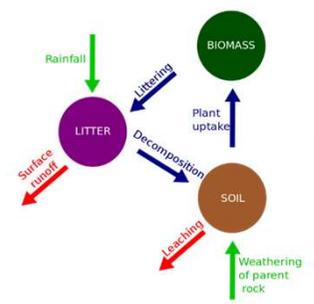
What is an Ecosystem?	
An ecosystem is a system in which organisms interact with each other and with their environment.	
Ecosystem's Components	
<b>Abiotic</b>	These are <b>non-living</b> , such as air, water, heat and rock.
<b>Biotic</b>	These are <b>living</b> , such as plants, insects, and animals.
	<b>Flora</b> <b>Plant life</b> occurring in a particular region or time.
	<b>Fauna</b> <b>Animal life</b> of any particular region or time.



Food Web and Chains	
Simple <b>food chains</b> are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level. <b>Food webs</b> however consists of a network of many food chains interconnected together.	

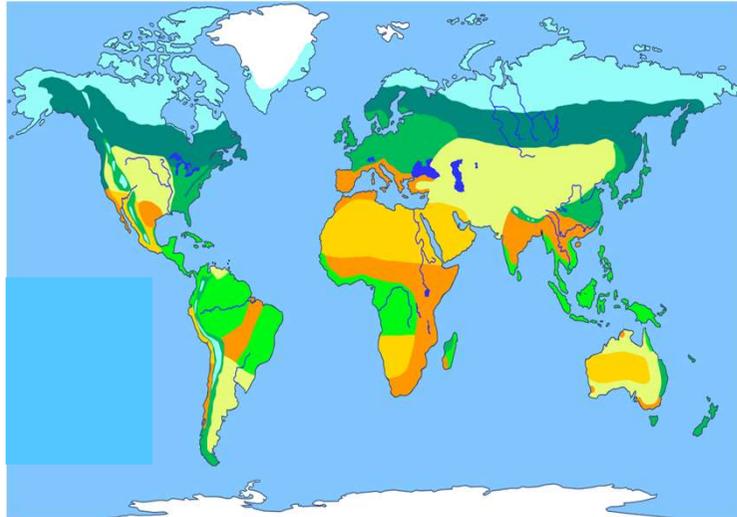
Biome's climate and plants						
Biome	Location	Temperature	Rainfall	Flora	Fauna	
<b>Tropical rainforest</b>	Centred along the Equator.	Hot all year (25-30°C)	Very high (over 200mm/year)	Tall trees forming a canopy; wide variety of species.	Greatest range of different animal species. Most live in canopy layer	
<b>Tropical grasslands</b>	Between latitudes 5°- 30° north & south of Equator.	Warm all year (20-30°C)	Wet + dry season (500-1500mm/year)	Grasslands with widely spaced trees.	Large hooved herbivores and carnivores dominate.	
<b>Hot desert</b>	Found along the tropics of Cancer and Capricorn.	Hot by day (over 30°C) Cold by night	Very low (below 300mm/year)	Lack of plants and few species; adapted to drought.	Many animals are small and nocturnal: except for the camel.	
<b>Temperate forest</b>	Between latitudes 40°-60° north of Equator.	Warm summers + mild winters (5-20°C)	Variable rainfall (500-1500m/year)	Mainly deciduous trees; a variety of species.	Animals adapt to colder and warmer climates. Some migrate.	
<b>Tundra</b>	Far Latitudes of 65° north and south of Equator	Cold winter + cool summers (below 10°C)	Low rainfall (below 500mm/ year)	Small plants grow close to the ground and only in summer.	Low number of species. Most animals found along coast.	
<b>Coral Reefs</b>	Found within 30° north – south of Equator in tropical waters.	Warm water all year round with temperatures of 18°C	Wet + dry seasons. Rainfall varies greatly due to location.	Small range of plant life which includes algae and sea grasses that shelters reef animals.	Dominated by polyps and a diverse range of fish species.	

Nutrient cycle	
Plants take in <b>nutrients</b> to build into new organic matter. Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by <b>decomposers</b> .	
<b>Litter</b>	This is the <b>surface layer</b> of vegetation, which over time breaks down to become <b>humus</b> .
<b>Biomass</b>	The total <b>mass of living organisms</b> per unit area.



Biomes
A biome is a <b>large geographical area of distinctive plant and animal groups</b> , which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.

# Geography



	Coniferous forest
	Deciduous forest
	Tropical rainforests
	Tundra
	Temperate grasslands
	Tropical grasslands
	Hot deserts.

The **most productive biomes** – which have the greatest biomass- grow in climates that are **hot and wet**.

### CASE STUDY: UK Ecosystem: Epping Forest, Essex

This is a typical English lowland deciduous woodland. **70% of the area** is designated as a **Site of Special Scientific Interest (SSI)** for its biological interest, with **66 %** designated as a **Special Area of Conservation (SAC)**.

Components & Interrelationships		Management
<b>Spring</b>	<b>Flowering plants</b> (producers) such as bluebells store nutrients to be eaten by consumers later.	- Epping has been managed for centuries. - Currently now used for <b>recreation and conservation</b> .
<b>Summer</b>	Broad tree leaves grow quickly to <b>maximise photosynthesis</b> .	- Visitors <b>pick fruit</b> and berries, helping to <b>disperse seeds</b> .
<b>Autumn</b>	Trees shed leaves to <b>conserve energy</b> due to sunlight hours decreasing.	- Trees cut down to encourage <b>new growth for timber</b> .
<b>Winter</b>	Bacteria <b>decompose</b> the leaf litter, releasing the nutrients into the soil.	

### Tropical Rainforest Biome

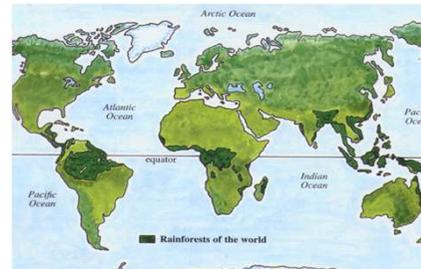
Tropical rainforest cover about **2 per cent** of the Earth's surface yet they are home to **over half of the world's plant and animals**.

### Interdependence in the rainforest

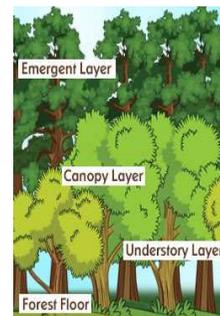
A rainforest works through **interdependence**. This is where the plants and animals **depend on each other** for survival. If one component changes, there can be **serious knock-up effects** for the entire ecosystem.

### Distribution of Tropical Rainforests

Tropical rainforests are **centred along the Equator** between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and South-East Asia. **The Amazon** is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.



### Layers of the Rainforest



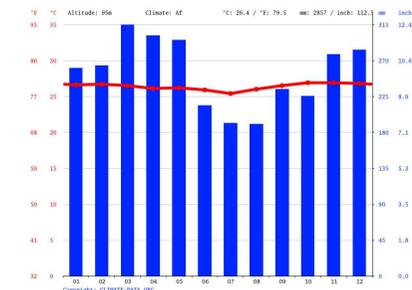
<b>Emergent</b>	Highest layer with trees reaching <b>50 metres</b> .
<b>Canopy</b>	80% of life is found here as it receives <b>most of the sunlight and rainfall</b> .
<b>Under Canopy</b>	Consists of trees that reach <b>20 metres high</b> .
<b>Shrub Layer</b>	Lowest layer with <b>small trees</b> that have adapted to living in the <b>shade</b> .

### Rainforest nutrient cycle

The **hot, damp conditions** on the forest floor allow for the **rapid decomposition** of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are in high demand from the many fast-growing plants, they do not remain in the soil for long and stay close to the surface. If vegetation is removed, the soils quickly become **infertile**.

### Climate of Tropical Rainforests

- Evening temperatures rarely fall below **22°C**.
- Due to the **presence of clouds**, temperatures rarely rise above **32°C**.
- Most afternoons have heavy showers, often thundery, from towering cumulonimbus clouds.
- Low air pressure
- At night with no clouds insulating, temperature drops.



## Case Study: The Amazon Rainforest in Brazil

### Deforestation in the Amazon. What has happened in Brazil?

- Around 20% of the Amazon rainforest has been cleared
- Clearance takes place for many reasons:
  - Harvesting of foods, fruits and nuts
  - Wood cut down and used as fuel
  - Timber extraction
  - To access plants needed for medicines
  - For **ranching** (animal farming)
  - **Monoculture** (one species of commercial plant, e.g. palm oil, replacing the natural plants)
  - For mining
  - For expansion of cities
  - **Slash-and-burn** agriculture
  - Highways

### What are the local impacts of tropical rainforest deforestation?

- Deforestation disrupts the water cycle. If transpiration of water from trees into the atmosphere isn't taking place, the local climate becomes warmer
- As soon as forest is removed, the soil starts to become **infertile**. It relies upon the leaves falling from trees and animals dying and decomposing to remain fertile.
- Rivers become polluted with chemicals washed-out from mines and soil washed-off the land if roots are no longer there to hold it in place
- The **indigenous tribes** decline

### Statistics about rainforest removal in the Brazilian Amazon

- 80% of the rainforest in Brazil has been removed for cattle ranching
- 10% of the rainforest has been removed for other commercial agriculture (e.g. palm oil plantations)
- Only 3% of the rainforest in Brazil has been cleared for logging – the extraction of trees to use their wood
- Soybean production in the Brazilian Amazon has increased by 600% in the last three decades
- Around 50,000 Hectares of land is used for gold mining
- Vast areas of land have been flooded so as Hydro Electric Power can be generated.
- The **Trans-Amazonian Highway** was created in 1972, it is 4000km long

### What goods does the Brazilian rainforest supply?

- Native food crops
- Wild meat and fish
- Building materials
- Energy from **HEP**
- Water
- Medicines



### What are the global impacts of tropical rainforest loss?

- **Global Warming** – as soon as trees are removed, they are no longer removing CO2 from the atmosphere and producing oxygen
- **Biodiversity** – the tropical rainforest is the most biodiverse biome in the world. Many species are **endemic**. Forest loss will mean species loss.:
  - Estimated that 137 plant and animal species per day are becoming extinct due to global tropical deforestation
  - Cures to common diseases may be in the rainforests, still undiscovered
  - The Amazon Basin could lose between 30 and 45% of its species diversity by 2030

### What services does the Brazilian rainforest supply?

- Air purification (absorbing CO2)
- Water and nutrient recycling
- Protection against soil erosion
- Wildlife **habitats**
- **Biodiversity**
- Employment



### What strategies exist for managing rainforests sustainably? National and International Level

- Governments can agree to limit the trade in hard woods (e.g. **mahogany**) and endangered species. The 2006 agreement limits hardwood trade to only specimens which have been felled in a sustainable manner. **CITES** is the Convention on International Trade in Endangered Species
- Debt Reduction – HICs can write off the debt of LIC's if they agree to preserve their rainforest
- Non Governmental Organisations such as WWF promote conservation and education
- National governments should create laws to limit forest loss. Few are willing to do so if this slows development

### What strategies exist for managing rainforests sustainably? Local Level

- **Selective logging** – removes just the individual trees that are needed and leave the rest of the area intact
- Stopping illegal logging – having a permit system for tree removal and fining/punishing those who remove trees without one.
- **Agroforestry** – allows crops to be carefully grown in clearings, surrounded by the normal tree habitats.
- **Ecotourism** – encourages people to visit rainforests to view the natural environment. Locals preserve it as the income from the tourists is incredibly valuable



## Case Study: The USA's Western Desert

### How diverse is the desert ecosystem in the Western USA?

- Not very diverse!
- Only 56 mammal species, 36 reptiles, 400 birds, 1700 plants, 60 mosses and 195 lichens
- Includes drought tolerant trees such as **acacia**
- **Cactus** which store moisture in their flesh. The **Saguaro Cactus** can grow to 15m tall. Its spikes deter predators and it has a concertina-shaped body which expands when it fills with water
- Many flowering plants have seeds which only germinate after heavy rain. They have bright flowers to attract insects
- **Lichen** looks like a flaky crust on the ground. It does not need soil to grow so is called a pioneer species.

### How have plants and animals adapted in the USA's desert?

- They have all had to adapt to the lack of water
- Grass is tough and drought resistant
- Kangaroo rats do not drink water, they obtain it from food. They live in burrows during the day to avoid heat and do not sweat. They have highly efficient kidneys

### What interdependence exists in the desert?

- Different species **depend** on one another in the food web
- Vegetation roots hold the soil together and stop it from being blown away
- Nutrients are **exchanged** between soil and vegetation

### What development opportunities are there in the Western USA desert?

- Farming – large underground stored of water (**aquifers**) can be used to make the land productive
- Energy – fantastic opportunity for solar power. Where mountainous, wind power can be harnessed in valleys – e.g. near to Palm Springs
- Tourism – places such as **Las Vegas** have sprung-up. Attracted 40 million visitors in 2018. Others may visit for watersports in places such as Lake Havassu, Lake Mead, Lake Powell and to visit Native American wildernesses

### What stops the Western USA deserts from becoming over developed?

- Temperatures can be extreme – **Death Valley** regularly sees temperatures above 50°C in the daytime.
- Because of the low populations, access is limited. This hindered early development, however freeways have now made some areas more accessible – e.g. Las Vegas.

### How have people adapted to the climate?

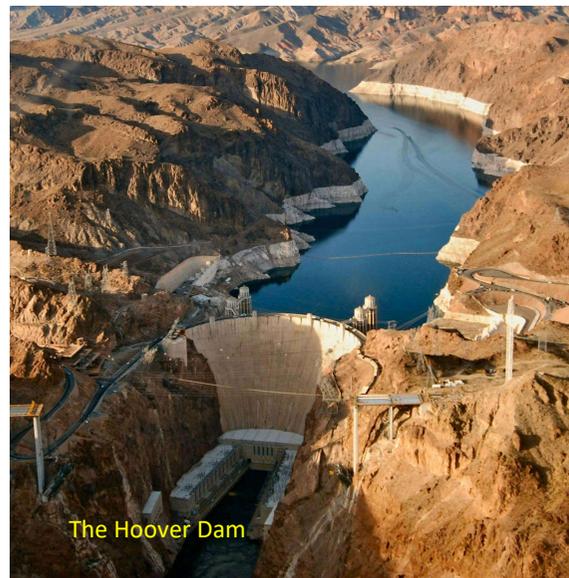
- Flat roofs on houses to help collect rainwater
- Buildings light in colour (whitewashed) to reflect heat
- More recently, a heavy reliance on **air conditioning**
- Watering of grass in gardens and golf courses. When water is in especially short supply, grass can be coloured with a green vegetable dye to prevent it looking 'dead'

### Do too many people live in the Western USA desert?

- In recent years, there has been a greater demand for water than there has been water available
- The **water security** of the area is threatened by climate change – as temperatures warm up, there is a concern that water availability will be further limited

### BENEFITS OF THE HOOVER DAM

- Consistent flow of water downstream in the Colorado River
- **Hydro Electric Power** is generated, powers nearby major cities such as Las Vegas
- A tourist attraction
- **Lake Mead** (behind the dam wall) is an excellent watersports resource
- Water can be pumped from the reservoir to nearby major cities such as Las Vegas



The Hoover Dam

### ISSUES ASSOCIATED WITH THE HOOVER DAM

- The downstream flow of water in the **Colorado River** has been altered:
  - Farmers downstream (including in Mexico) previously relied upon periods of peak flow to irrigate their land
  - The lack of flooding downstream starves **sandbanks** of sand and they have deteriorated
- Some would say it is unsightly. It is a change to the natural valley environment
- Land has had to be flooded to create Lake Mead





# History

## How did the Germans view the Treaty?

They hated it & thought it was very unfair because:

- Many Germans didn't realise that they were actually losing the war & believed that they could have continued fighting. They blamed the new German government for their defeat. The new government was nicknamed 'the November Criminals'.
- The Kaiser had been forced to abdicate, so people thought the person who was to blame had been punished.
- None of their allies were punished as harshly.
- It would be very difficult for Germany to recover from the war & pay off the reparations. Areas like the Saar with its coal fields were needed to fuel German factories, but this area now belonged to France.
- Many Germans were not given the right to self-determination e.g. those living in the Polish Corridor.
- Germany felt defenceless, as they were surrounded by enemies & had a tiny army.
- They had no choice but to sign it - it was a diktat

## The USA's attitude

Many Americans wanted to return to isolationism. The Republican Party criticised Woodrow Wilson and the Senate refused to ratify the treaty. The USA failed to join the League of Nations.

## The other peace treaties

**St Germain:** signed by Austria. Land lost to Italy, Yugoslavia & Poland, reparations to be paid, but total never fixed, army reduced to 30,000.

**Neuilly:** signed by Bulgaria. Land lost to Yugoslavia, Greece & Romania, £100m reparations, army limited to 20,000, no air force.

**Trianon:** signed by Hungary. Land lost to Romania, Czechoslovakia & Yugoslavia, Agreed reparations should be set but no amount agreed, 30,000 in army, no conscription.

**Sevres:** signed by Turkey. Land lost to Greece, army restricted to 50,000, 7 sail boats & 6 torpedo boats in the navy.

**Lausanne:** signed by Turkey (the Turkish people revolted after hearing the terms of Sevres), Turkey regained some of the land Greece had taken & reparations cancelled.

Key Terms	Definitions
<b>Anschluss</b>	The union of Germany & Austria. This was forbidden in the Treaty of Versailles.
<b>Abdicate</b>	When a ruler gives up their throne
<b>Diktat</b>	A forced treaty
<b>Isolationism</b>	The policy where a country doesn't get involved in foreign affairs

## How satisfied were the Big Three?

	Liked 	Disliked 
Britain	Many people thought it was fair but could have been harsher. GB gained Germany's colonies. Germany's navy was restricted.	Lloyd George worried that reparations were too harsh, GB needed to start trading with Germany quickly.
France	Pleased with the demilitarisation of the Rhineland, as France had more protection. Reparations & control of the Saar.	Many felt the treaty should have been harsher. Clemenceau was angry that Germany still had an army & wanted more reparations.
USA	The League of Nations was created. Some countries were given self-determination.	Many felt the treaty was too harsh & might cause problems in the future.

## Why can the treaty be seen as fair?

It was normal for the losers to agree to harsh terms. Russia left the war in 1917 & had to give Germany more than  $\frac{1}{4}$  of its land. Someone had to pay for the damage, it was only right the losers should pay.



# History

## Year 10 History Knowledge Organiser- The League in the 1920s

### The League

**Aim:** stop war breaking out again, encourage disarmament, improve working conditions & tackle deadly diseases

**Members:** 42 at first, but no USA (didn't want to join) Germany or Russia (not allowed to join).

**Collective security:** idea that all countries would work together to keep the peace.

If disputes broke out: the **Covenant** set put how the League would deal with aggression:

- **Mitigation:** getting countries together to talk through problems
- **Moral condemnation:** telling countries off
- **Economic sanctions:** members of the League wouldn't trade with the offender.

The League didn't have its own army, it had to borrow men from its members.

### The structure of the League

**Assembly:** every member sent a representative to the Assembly which met once a year. Decisions has to be unanimous. It made decisions such as when a new country could join & how the League's money was spent.

**Council:** met more frequently than the Assembly & dealt with emergencies. 4 main members, GB, France, Japan & Italy & 4 non-permanent. Had the power of **veto** over decisions made by the Assembly.

**Permanent Court of International Justice:** settled international arguments. It listened to the evidence but counties did not have to follow its rulings.

**Secretariat:** was in charge of administration.

**Special commissions:** special groups which tackled specific issues e.g.

**International Labour Organisation:** wanted to improve working conditions. It recommended the banning of lead in paint but couldn't stop children under 14 working.

**Slavery Commission:** set 200,000 people free in Sierra Leone.

Key Terms	Definitions
<b>Covenant</b>	An agreement which set out the League's aims & what its members could expect
<b>Veto</b>	The right to overrule a decision
<b>Plebiscite</b>	When the people vote on an issue

### Vilna 1920

- Poland took control of the capital of Lithuania, Vilna.
- Lithuania appealed to the League for help.
- The League told Poland to remove its army, it didn't.
- The league didn't do anything else, as France saw Poland as an ally against Germany.



### Upper Silesia 1921-25

- 1921: a **plebiscite** was held to decide if the area should be German or Polish. Germany won 60% of the vote but Poland claimed that many of the people who had voted for Germany no longer lived there.
- The area was split based on which parts had voted for which country.
- Germany received most of the rural areas, but lost  $\frac{3}{4}$  of their coal mines.
- Poland received the industrial areas, but  $\frac{1}{2}$  million Poles were in the German territory.



LEAGUE OF NATIONS



SOCIETE DES NATIONS



A British cartoon from December 1919 called 'The Gap in the Bridge'.



# History

Key Terms	Definitions
Disarmament	The reduction of weapons

## Aaland Islands 1921

- Sweden & Finland both claimed them
- The League gave them to Finland but they couldn't build forts on the islands
- Sweden agreed.



## Corfu 1923

- Tellini, an Italian general was murdered whilst surveying the borders of Greece & Albania.
- Mussolini (the Italian leader) blamed the Greek government & demanded the murderers should be executed & he should receive compensation.
- He invaded Corfu.
- Greece appealed to the League, who condemned Italy but said that Greece should pay compensation.
- Mussolini complained to the Conference of Ambassadors. They force Greece to pay compensation.



## Bulgaria 1925

- Greek soldiers killed on the border of Greece & Bulgaria.
- Greece invaded Bulgaria
- Bulgaria asked the League for help. The League told the Greeks to withdraw & pay compensation.
- Greece thought this was unfair as Mussolini had done the same thing in 1923 & got away with it. But Greece was too small to stand up to the League.



## The Wall Street Crash 1929

- The Crash turned into a world wide depression.
- Countries had little money to spend on world wide problems & were more concerned with sorting out their own issues.
- Some countries turned to extremist parties such as the Nazis in Germany



## What international agreements were made in the 1920s?

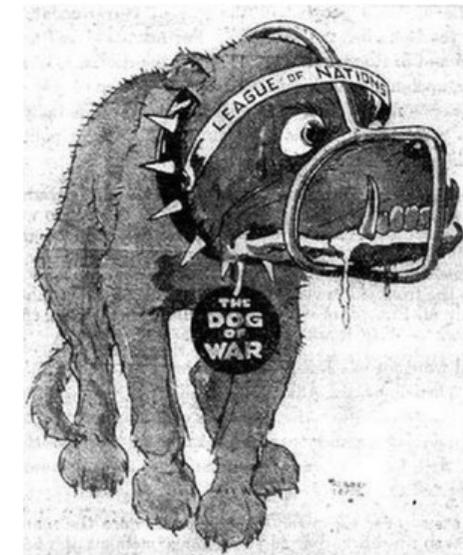
**1925: Locarno Treaties.** Signed between France, Germany, GB & others. Germany accepted the borders Versailles had set out, the countries agreed not to go to war & work together peacefully.

**1928: Kellogg-Briand Pact.** 65 countries agreed not to use war to settle disputes.

**1921-22: Washington Arms Conference.** GB, France & others attended. Discussed how big navies could be, Japan agreed to have a smaller navy than the USA & GB.

**1922: Rapallo Treaty.** Germany agreed to return the money & land Russia had lost in the 1917 peace treaty.

**Result: failure for the League as it was not involved in any of these agreements.**

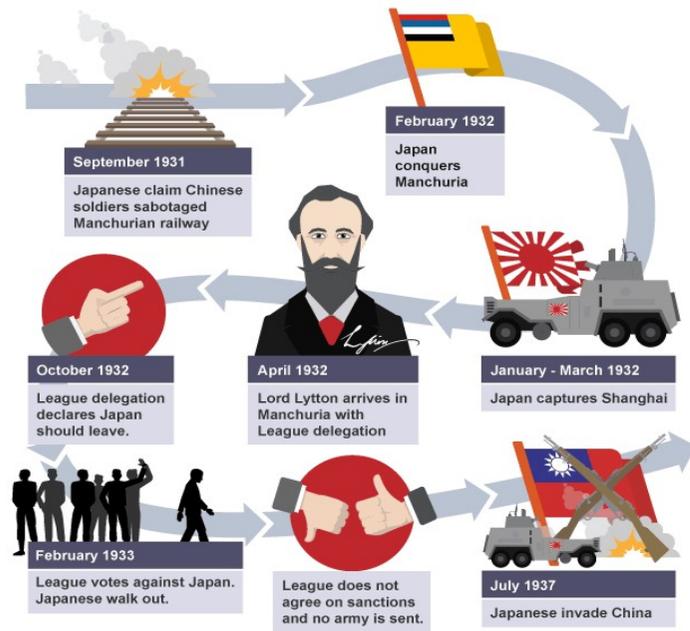




# History

## Manchuria 1931

Japan had been badly affected by the Great Depression (sales to the USA of silk had dropped), shew anted to protect the industries & South Manchurian Railway which it already controlled in the area & the Japanese army was getting stronger and had started to take more aggressive action.



### What did the League do?

Issued a moral condemnation & told Japan to withdraw it's troops. But there was little the League could do as:

- Japan was far away & many countries were too busy dealing with their own problems caused by the Great Depression.
- Economic sanctions were pointless, as Japan would continue trading with the USA.
- The USSR was not a member of the League & could not be asked to help even though it was the nearest country.

### Results

Even though the Lytton Report said Japan was in the wrong, Japan ignored it & left the League. Japan was a permanent member of the Council.

**BUT** many people still believed that if there was an issue in Europe, then the League would still deal with it successfully.

**However**, Mussolini & Hitler began to wonder if they might get around the League as well.

### What happened in Abyssinia?

**December 1934:** Italian soldiers clashed with Abyssinians at Wal Wal. 150 Abyssinians killed & 2 Italians.

**Jan 1935:** French foreign minister, Pierre Laval met with Mussolini & made secret agreements which would let Mussolini do what he wanted in Abyssinia.

**Jun 1935:** Abyssinian emperor, Haile Selassie asked the League for help

**Oct 1935:** Italy invaded, despite a moral condemnation issued by the League.

**Dec 1935:** Hoare-Laval Pact agreed.

**May 1936:** Abyssinian capital, Addis Ababa captured

### Why did the League fail? The Hoare-Laval Pact

GB & France's foreign ministers Pierre Laval & Samuel Hoare decide that Italy would be given half of Abyssinia. Italy would be given the fertile areas. This plan was not discussed with Italy or Abyssinia.

The Hoare-Laval Pact was made public in the newspapers. Both men were forced to resign.

### Why did the League fail? Trade sanctions

**Italy:** the sanctions imposed did not cover oil, steel, iron or coal (GB didn't want it's coal mining industry affected) & the League felt Italy would just trade with the USA & USSR.

**Abyssinia:** the League banned members from selling arms (weapons) to Abyssinian & Italy. Abyssinian had nothing to defend itself with.

### Why did the League fail? Suez Canal

Mussolini would need to send troops & supplies around the coast of Africa if the Suez Canal was shut. This would make his invasion very difficult. GB & France kept the canal open.

### Results

- May 1936: Italy left the League. This left only GB, France & the USSR (who joined in 1934) to run the League.
- GB & France had shown they were more concerned about their own welfare than protecting the League.
- Aggressive dictators like Hitler & Mussolini realised the League wouldn't stop them.



# History

## The League had no army

**Evidence:** when Japan ignored the League over Manchuria, there was nothing the League could do.



## Weak sanctions

**Evidence:** Powerful countries were not scared of moral condemnation, so the League's sanctions were useless.



## Self-interest of dominant countries

**Evidence:** GB & France were more concerned about keeping Mussolini as an ally against Hitler to do anything about the invasion of Abyssinia.



## Absence of powerful countries

**Evidence:** The USA refused to join & Germany & the USSR were not allowed to at the beginning. This meant that trade sanctions were ineffective, as the aggressor could trade with them. In the Manchuria Crisis, the USSR was the nearest country to China.



## Slow & inefficient decision making

**Evidence:** The League only met once a year; the Council could veto proposals & decisions had to be unanimous. This made decision making slow. The League was slow to act in the Manchurian Crisis.



## The Great Depression

**Evidence:** The Great Depression meant countries were more concerned with their own problems. The Depression meant that people turned to extremist dictators such as Hitler & Mussolini who were keen to invade other countries. Hitler invaded more & more countries & the League didn't do anything about it.





# History

## Hitler's aims

- Overturn the Treaty of Versailles
- Make Germany strong again
- Take Lebensraum
- Unite Volkesdeutsch & create a Greater Germany
- Unite Austria & Germany in Anschluss
- Destroy communism



Key Terms	Definitions
Lebensraum	Living space in the east
Volkesdeutsch	People with German blood, but without German citizenship
Communism	The left-wing political idea that all people are equal & wealth should be shared equally
Plebiscite	A vote by all the people

## 1933: Hitler leaves the League of Nations Disarmament Conference

Hitler offered to disarm as long as everyone else did. France refused. Hitler left the League

## Jan 1935: Saar Plebiscite

Saar given to France for 15 years in Versailles. Plebiscite held to decide if the area remained French or returned to Germany. 90% of the population voted to re-join Germany

## April 1935: Stresa Front

Agreement between GB, France & Italy to stop Hitler from breaking any more terms of Versailles.

## March 1936: Remilitarisation of the Rhineland

Hitler sent troops into the Rhineland after the Franco-Soviet pact was signed (France & the USSR agreed to support each other if attacked by Germany). Hitler claimed Germany was threatened on both sides & needed to remilitarise the area.

## Why didn't other countries react to the remilitarisation of the Rhineland?

**Britain:** many people felt Germany had the right to protect it's own borders & was reclaiming what was rightfully theirs. GB was already dealing with the Abyssinian Crisis.

**France:** concerned with it's own internal problems & Abyssinia. French generals also believed the German invasion force was much bigger than it was & weren't prepared to risk fighting.  
**The League:** focused on Abyssinia.

## 1934: The Dollfuss Affair (attempted Anschluss)

Austrian Chancellor, Dollfuss banned the Nazi Party in 1934. Hitler told Austrian Nazis to cause chaos. Dollfuss murdered. Mussolini moved troops to the border, promising to stop Anschluss. Hitler was forced to back down.

## 1935: Rearmament

Hitler reintroduced conscription, announced he was building an air force (both banned by Versailles). No one tried to stop him.



## June 1935: Anglo-German Naval Agreement

GB agreed Hitler could build hi navy to 35% of GB's & submarines to 45%. GB didn't consult France & Italy before signing it.



## Results of the remilitarisation:

- Hitler grew in confidence & started to plan his next move.
- GB & France started to rearm.
- Mussolini & Hitler signed the Rome-Berlin Axis, as Mussolini thought Hitler was a force to be reckoned with.

Key Terms	Definitions
Remilitarisation	Rebuilding stores of weapons and troops or sending troops back into an area where they were banned



# History



## Anschluss

**1934:** Schuschnigg becomes leader of Austria. He did a deal with the Nazis to keep him in power. In return they were given key positions in the Austrian government.

**Jan 1938:** plans discovered for Schuschnigg's assassination.

Schuschnigg met with Hitler. He 'agreed' to appoint the Nazi, Seyss-Inquart as minister for the interior, with full power over the police. If Schuschnigg didn't agree, Hitler would invade.

When Schuschnigg returned to Austria he decided to hold a plebiscite. If the people voted against Anschluss, Hitler would not be able to invade.

**11 March 1936:** Hitler demanded the plebiscite be postponed. Schuschnigg agreed, Hitler then forced him to resign. Seyss-Inquart became chancellor.

**12 March 1938:** Nazi troops invaded Austria. Mussolini did nothing.

**10 April:** plebiscite held. 99% voted in favour of Anschluss.

## The Sudetenland: How did Hitler take over?

The German speakers in the Sudetenland claimed they were being persecuted by the Czechs. They started rioting.

**May 1938:** Hitler said he needed to step in to save the German-speakers in the area.

**Sept 1938:** the British prime minister, Neville Chamberlain flew to Germany to meet Hitler. Chamberlain agreed to let Hitler have the area, as long as this happened peacefully.

Chamberlain met with the Czechs & forced them to agree.

**22<sup>nd</sup> Sept 1938:** Chamberlain returned to Germany & Hitler told him that he wanted the Sudetenland by 1<sup>st</sup> Oct. This was not what had been agreed at first.

**29<sup>th</sup> Sept 1938:** Munich Conference held. GB, France, Italy & Germany agreed to give Germany the Sudetenland. The Czech government was not consulted.

**15<sup>th</sup> March 1939:** Hitler took over the rest of Czechoslovakia.

## Results of Anschluss:

**Germany** became stronger, Hitler had united more German speakers. Austria was also rich in natural resources such as steel & iron. It was a propaganda success for Hitler.

**GB:** many people didn't want another war, so didn't want to get involved.

**France** was dealing with it's own problems & didn't get involved.

**Czechoslovakia:** the Czech government was very worried as they knew Czechoslovakia would be next on Hitler's list. France agreed to support them if Hitler attacked. Chamberlain, the British prime minister asked Hitler what he intended to do to Czechoslovakia. Hitler gave his word of honour that Czechoslovakia was safe.

## Why did Hitler target the Sudetenland?

- Czechoslovakia established by Versailles - Hitler had promised to overturn this treaty.
- The Sudetenland could help Hitler's war effort as it had factories which produced weapons, tanks & glass
- 3 million German speaking people lived there.
- If Hitler controlled the area, he could then attack the rest of Czechoslovakia.





# History

## Why did Chamberlain act this way?

He was following the policy of **appeasement** - trying to avoid war by giving Hitler what he wanted.



### Results:

- The USSR was not consulted & Stalin felt betrayed & angry. Hitler was getting closer to the USSR & Stalin started to look for ways to protect the USSR.
- Chamberlain believed that he had achieved 'peace in our time', as Hitler had agreed never to go to war with GB in the Anglo-German declaration
- This was the first time Hitler had invaded a country which he had no right to & he had got away with it.
- Chamberlain promised Poland that if it was attacked GB would help it

### Arguments for appeasement

- Many people felt the Treaty of Versailles had been too harsh on Germany & it was only fair to let Hitler overturn parts of it.
- People were terrified there would be another major war.
- The Great Depression meant countries could not afford to go to war.
- People were more scared of communism than Hitler. They thought a strong Germany would stop Stalin.
- Hitler said he was a man of peace & they believed him.

### Arguments against appeasement

- If countries had acted earlier against Hitler, it might not have ended up in a war.
- The more Hitler took, the more confidence he became.
- Appeasement was morally wrong, it left countries like Austria & Czechoslovakia on their own.
- **Appeasement** angered Stalin as he was left out & felt that the USSR might be next. He could have been a powerful ally.

### Results:

- Stalin didn't trust Hitler, but the Pact bought him time to prepare for war.
- Territory in Poland would be a buffer between Germany & the USSR, which would be useful if Hitler did invade.
- Hitler now knew he could invade Poland without having to fight on 2 fronts.
- The Pact made the British people realise that war was imminent. They confirmed their previous agreement that if Hitler invade Poland Britain would fight.

Key Terms	Definitions
<b>Sudetenland</b>	An area of Czechoslovakia which was on the border with Germany
<b>Appeasement</b>	The policy of giving someone what they wanted in the hope of avoiding war
<b>Stalin</b>	The leader of the USSR
<b>Anglo-German declaration</b>	The agreement between GB & Germany not to go to war
<b>Nazi-Soviet Pact</b>	Agreement between Germany & the USSR to split Poland between them.

### Why was the Nazi-Soviet Pact signed?

- Both Hitler & Stalin hated Poland & wanted its territory.
- The USSR had joined the League in 1934, but Stalin had seen how weak it had been over Manchuria & Abyssinia. He didn't believe it would protect the USSR if Hitler invaded it.
- 23<sup>rd</sup> August 1939: Nazi-Soviet Pact signed between them.
- GB & France had allowed Germany to become stronger, so that it could act as a barrier against communism. If they didn't trust Stalin, why should he trust them?
- Stalin was not invited to attend the Munich Conference.
- Hitler would not have to fight a war on 2 fronts (like in the WW1).
- When war broke out, the USSR would be on Germany's side, not GB & France's.

### What was agreed in the Nazi-Soviet Pact?

- Poland would be split between Germany & Poland, Hitler would do all the fighting.



# History

## The invasion of Poland

**1<sup>st</sup> Sept 1939:** Hitler invaded Poland.

**3<sup>rd</sup> Sept:** the British sent an ultimatum to Germany. If Germany didn't send assurances that its army would be withdrawn from Poland by 11am, then Britain would declare war. There was no reply.

Britain declared war on Germany, France followed suit.

## What were the causes of the Second World War?

**The Treaty of Versailles:** too harsh, Hitler promised to get rid of it & reunite the German speaking people. Many people in Germany felt by the 1930s it was too harsh & Germany had the right to overturn it.

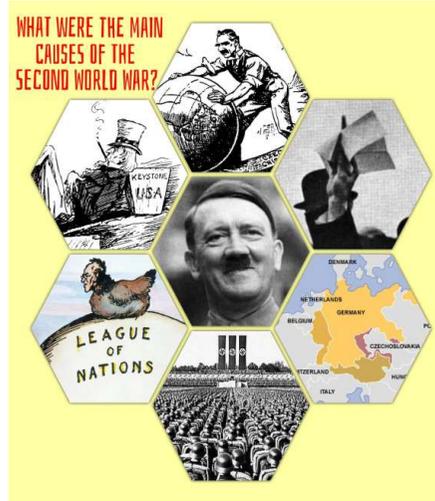
**Hitler:** He wanted to overturn the Treaty of Versailles, so he had to invade other countries.

**The failure of the League of Nations:** Failed in Manchuria & Abyssinia which showed the League was weak, GB & France would undermine the League & because it didn't have an army it couldn't act.

**The Depression:** countries were busy with their own problems & didn't want to get involved in international issues. Desperate people turned to extremist leaders such as Hitler & Mussolini & the League couldn't help.

**Appeasement:** Opportunities to stop Hitler early on were missed. Politicians such as Chamberlain made a mistake trusting Hitler & the Munich Agreement pushed Stalin into an alliance with Hitler.

**The Nazi-Soviet Pact:** Allowed Hitler to invade Poland which GB & France had promised to defend. It meant Hitler did not have to fight on 2 fronts.



Key Terms	Definitions
Ultimatum	A final demand

## Key people:

- **David Lloyd George:** British prime minister. Member of the 'Big Three' at Versailles.
- **George Clemenceau:** French prime minister. Member of the 'Big Three'.
- **Woodrow Wilson:** American president. Member of the 'Big Three'.
- **Benito Mussolini:** dictator of Italy. Involved in Corfu incident, invaded Abyssinia & ally of Hitler's.

- **Lord Lytton:** sent by the League to investigate the events in Manchuria. Author of the Lytton Report which stated Japan was in the wrong.
- **Sir Samuel Hoare & Pierre Laval:** British & French foreign ministers. Conducted secret talks with Mussolini to find a solution to the Abyssinia crisis. Both men forced to resign when it became public that they planned to give half of Abyssinia to Italy.
- **Adolf Hitler:** German dictator. Promised to overthrow the Treaty of Versailles.
- **Dollfuss:** Austrian Chancellor murdered in 1934. Hitler tried to unite Austria & Germany after his death.
- **Schuschnigg:** replaced Dollfuss as Austrian chancellor, tried to hold a plebiscite to prevent Hitler from achieving Anschluss, forced to resign in 1936.
- **Seys-Inquart:** A Nazi who Schuschnigg was forced to appoint as minister of interior in 1938. Became Austrian chancellor.
- **Joseph Stalin:** leader of the USSR, signed Nazi-Soviet Pact.
- **Neville Chamberlain:** British prime minister, followed a policy of appeasement towards Hitler during the 1930s.

# Year 10 French: Hobbies, daily life, & celebrations

Qu'est-ce que tu fais pendant ton temps libre ?	A	What do you do during your time free?
Ce qui j'aime le plus, c'est de faire les magasins	1	What I like most is to go shopping
parce que j'adore acheter des vêtements,	2	because I love to buy clothes
même si ça coute les yeux de la tête !	3	even if it costs the earth! ( <i>lit: costs the eyes of the head</i> )
Je le fais tous les week-ends.	4	I do it every weekend.
J'aime aussi retrouver mes amis en ville.	5	I also like to meet my friends in town.
De plus, j'ai une passion pour le cinéma	6	Moreover, I have a passion for the cinema
surtout les films d'horreur car ils sont passionnants.	7	especially horror films because they are exciting.
<b>Es-tu sportif/ve ?</b>	<b>B</b>	<b>Are you sporty ?</b>
Oui, je dirais que je suis plutôt sportif/ve.	8	Yes, I would say that I am rather sporty.
Personnellement je préfère les sports individuels	9	Personally I prefer individual sports,
mais mes amis adorent jouer en équipe.	10	but my friends love to play in a team.
Je fais de la natation depuis quatre ans et	11	I've done swimming for four years and
je pense que c'est un beau sport	12	I think that it's a beautiful sport
qui est bon pour le corps et le mental.	13	which is good for the body and the mind.
<b>Qu'est-ce que tu fais en ligne ?</b>	<b>C</b>	<b>What do you do online?</b>
Je dirais que je suis accro à l'Internet !	14	I would say I am addicted to the Internet !
J'utilise les réseaux sociaux tous les jours	15	I use social media everyday.
bien que ce soit une perte de temps.	16	although it is a waste of time.
Il est facile de faire des recherches	17	It is easy to do research
donc je pense que c'est très pratique et utile.	18	so I think that is it very practical and useful.
<b>Qu'est-ce que tu aimes comme musique ?</b>	<b>D</b>	<b>What do you like as music?</b>
Je suis fan de la musique pop	19	I am a fan of pop music
parce que ça me donne envie de danser !	20	because it makes me want to dance!
Je l'écoute souvent sur mon portable	21	I often listen to it on my phone
en faisant mes devoirs.	22	while doing my homework.
L'année dernière je suis allé à un concert de Stromae	23	Last year I went to a Stromae concert
c'était une expérience incroyable !	24	it was an incredible experience!
<b>Qu'est-ce que tu aimes à lire ?</b>	<b>E</b>	<b>What do you like to read?</b>
Quand j'étais plus jeune, j'adorais les BDs	25	When I was more young, I used to love comics
mais maintenant je ne lis que les romans policiers	26	but now I only read crime novels
parce qu'ils sont les plus intéressants.	27	because they are the most interesting.
<b>Parle-moi de ta routine quotidienne.</b>	<b>F</b>	<b>Tell me about your routine daily.</b>
Normalement je me lève assez tôt	28	Normally I get up quite early
mais les week-ends je peux faire la grasse matinée.	29	but on the weekends I can have a lie in.
Je prends des céréales pour mon petit-déjeuner	30	I have some cereal for my breakfast

et je vais au collège à pied.	31	and I go to school by foot.
Après avoir fini mes devoirs	32	After having finished my homework
je me détends le soir	33	I relax in the evening.
Par exemple, hier j'ai regardé la télé-réalité	34	For example, yesterday I watched reality-tv
avant de me coucher	35	before going to bed
parce que c'était très divertissant.	36	because it was very entertaining.
<b>Comment fêtes-tu Noël ?</b>	<b>G</b>	<b>How do you celebrate Christmas?</b>
D'habitude on célèbre chez mes grands-parents.	37	Usually we celebrate at my grandparents' house.
Le matin on ouvre des cadeaux	38	In the morning we open some presents
avant de manger un repas énorme l'après-midi	39	before eating an enormous meal in the afternoon
avec la dinde rôtie et beaucoup de légumes.	40	with roast turkey and lots of vegetables
et une buche de Noël pour dessert.	41	and a Yule log for dessert.
Je bois du coca et mes parents boivent du vin.	42	I drink coke and my parents drink wine.
Je porte une jolie robe car c'est une journée spéciale	43	I wear a pretty dress because it's a day special.
et je m'amuse bien.	44	and I have a lot of fun.
L'année dernière j'ai reçu une console de jeux	45	Last year I received a games console
mais cette année je voudrais de l'argent.	46	but this year I would like some money.
A mon avis, la chose la plus importante	47	In my opinion, the thing the most important
c'est de passer du temps ensemble.	48	it is to spend time together.

**Sentence builder 1: Giving a justified opinion on TV.**

OPINION	NOUN	CONNECTIVE + VERB	ADJECTIVE
J'aime I like	les documentaires documentaries	parce qu' <b>ils</b> sont because they (m) are	amusants fun divertissants entertaining fascinants fascinating passionnants exciting originaux original éducatifs educational (trop) sérieux (too) serious ennuyeux boring stupides stupid
J'adore I love	les magazines culturels talk shows	parce qu' <b>ils</b> <b>ne sont pas</b> because they (m) are not	amusants fun divertissants entertaining fascinants fascinating passionnants exciting originaux original éducatifs educational (trop) sérieux (too) serious ennuyeux boring stupides stupid
Je n'aime pas I don't like	les jeux télévisés game shows	parce qu' <b>elles</b> sont because they (f) are	amusantes fun divertissantes entertaining fascinantes fascinating passionnantes exciting originales original éducatives educational (trop) sérieuses (too) serious ennuyeuses boring stupides stupid
Je déteste I hate	les dessins animés cartoons	parce qu' <b>elles</b> <b>ne sont pas</b> because they (f) are not	amusantes fun divertissantes entertaining fascinantes fascinating passionnantes exciting originales original éducatives educational (trop) sérieuses (too) serious ennuyeuses boring stupides stupid
J'apprécie I appreciate	les feuilletons soap operas		
J'ai une passion pour I have a passion for	les séries series		
J'ai horreur des* I really despise	les actualités / les infos the news		
J'en ai marre des* I've had enough of	les émissions de musique music programmes		
*no 'les' after these.	les émissions de télé-réalité reality tv shows		

**Je ne les rate jamais** = I never miss them

## Sentence builder 2: Comparing opinions on films &amp; books

OPINION PHRASE	1 <sup>ST</sup> NOUN	VERB		ADJECTIVE		2 <sup>ND</sup> NOUN
<b>Je pense que</b> I think that	<b>les films d'action</b>	<b>sont</b> are	<b>plus</b> more <b>moins</b> less <b>aussi</b> as	<b>passionnants</b> exciting	<b>que</b> than/ as	<b>les romans policiers</b> crime stories
<b>Je crois que</b> I believe that	<b>les films d'horreur</b>			<b>ennuyeux</b> boring		<b>les romans d'amour</b> love stories
<b>À mon avis</b> In my opinion	<b>les films fantastiques</b> fantasy films			<b>passionnantes</b> exciting		<b>les bandes-dessinées</b> comics (les BDs)
	<b>les comédies</b>			<b>ennuyeuses</b> boring		

N.B. The adjective here always agrees with the FIRST noun.

## Sentence builder 3: Talking about doing sport/music (how long, how often &amp; why)

VERB	HOW OFTEN	'SINCE'	HOW LONG	REASON
<b>je joue au basket</b> <b>je joue au foot</b> <b>je joue au tennis</b> <b>je joue à la pétanque</b> (bowls) <b>je joue aux cartes</b> (cards) <b>je joue aux échecs</b> (chess) <b>je joue de la batterie</b> (drums) <b>je joue du piano</b>	<b>tous les jours</b> everyday <b>tous les soirs</b> every evening <b>tous les samedis</b> every Saturday <b>une fois par semaine</b> one time a week	<b>depuis</b> since	<b>deux ans</b> two years  <b>six mois</b> six months	<b>car c'est amusant / rigolo.</b> because it's fun <b>car c'est bon pour le corps et le mental.</b> because it's good for the body and the mind <b>car quand je fais ça, j'oublie mes problèmes.</b> because when I do it, I forget my problems.  <b>parce que ça me fait du bien.</b> because it does me good. <b>parce que ça me détend.</b> because it relaxes me.  <b>parce que ça booste le moral.</b> because it boosts your mood.
<b>je fais de l'équitation</b> (I do horseriding) <b>je fais de l'escalade</b> (climbing) <b>je fais de la danse</b> <b>je fais de la natation</b> (swimming) <b>je fais de la photographie</b> <b>je fais du vélo</b> (bike riding)	<b>souvent</b> often <b>de temps en temps</b> from time to time <b>rarement</b> rarely			

## NEGATIVE 'SANDWICHES'

<b>je ne joue pas</b>	<b>I don't play</b>
<b>je ne joue plus</b>	<b>I no longer play</b>
<b>je ne joue jamais</b>	<b>I never play</b>

The French verb is always in the middle!

## SUPERLATIVES (the most/least/best/worst)

<b>le tennis est le plus difficile</b>	(the) tennis is the most difficult
<b>les comédies sont les plus amusantes</b>	(the) comedies are the most funny/the funniest
<b>les BDs sont les moins intéressantes</b>	(the) comics are the least interesting
<b>le tennis est le meilleur/le pire sport</b>	(the) tennis is the best/the worst sport
<b>la natation est la meilleure/la pire sport</b>	(the) swimming is the best/the worst sport

Remember your agreements – m/f/pl nouns need m/f/pl adjectives!

**Sentence builder 4: Advantages & disadvantages of the internet**

<b>Sur Internet</b> on the internet	<b>il est possible de</b> it is possible to  <b>il est facile de</b> it is easy to	<b>rester en contact avec les amis,</b> stay in contact with friends <b>parler avec les copains,</b> talk with friends <b>faire des recherches pour les devoirs,</b> do research for homework <b>partager des photos</b> share photos	<b>ce qui est</b> which is	<b>amusant / rigolo</b> fun <b>divertissant</b> entertaining <b>pratique</b> practical <b>utile</b> useful <b>indispensable à la vie sociale</b> essential for your social life
<b>Cependant</b> <b>Par contre</b> however	<b>il est dangereux de</b> it is dangerous to	<b>partager les détails personnels,</b> share personal details <b>tchatter avec des inconnus,</b> chat with strangers <b>passer trop de temps en ligne,</b> spend too much time online	<b>ce qui est</b> which is	<b>inquiétant</b> worrying  <b>un problème sérieux</b> a serious problem
<b>Je pense qu'</b> I think that <b>À mon avis</b> In my opinion	<b>il est important de</b> it is important to	<b>faire du sport</b> do sport <b>passer du temps avec la famille</b> spend time with family <b>retrouver les amis en vrai</b> meet up with your friends in real life <b>ne pas devenir accro</b> not become addicted	<b>aussi</b> also	<b>pour une mode de vie équilibré.</b> for a balanced lifestyle.

**Sentence builder 5: Holiday traditions in 3 tenses ('je' form)**

PAST (PERFECT TENSE)	PRESENT	NEAR FUTURE
L'année dernière... (last year)	Cette année... (this year) Normalement...	L'année prochaine... (next year...)
<b>je suis allé(e) chez mes grands-parents</b> I went to my grandparents' house	<b>je vais chez mes grands-parents</b> I go to my grandparents' house	<b>je vais aller chez mes grands-parents</b> I am going to go to my grandparents' house
<b>j'ai préparé le repas</b> I prepared the meal	<b>je prépare le repas</b> I prepare the meal	<b>je vais préparer le repas</b> I am going to prepare the meal
<b>j'ai mangé de la dinde</b> I ate turkey	<b>je mange de la dinde</b> I eat turkey	<b>je vais manger de la dinde</b> I am going to eat turkey
<b>j'ai bu du coca</b> I drank coke	<b>je bois du coca</b> I drink coke	<b>je vais boire du coca</b> I am going to drink coke
<b>j'ai reçu des cadeaux</b> I received presents	<b>je reçois des cadeaux</b> I receive presents	<b>je vais recevoir des cadeaux</b> I am going to receive presents
<b>j'ai donné des cadeaux</b> I gave presents	<b>je donne des cadeaux</b> I give presents	<b>je vais donner des cadeaux</b> I am going to give presents
<b>j'ai ouvert des cadeaux</b> I opened presents	<b>j'ouvre des cadeaux</b> I open presents	<b>je vais ouvrir des cadeaux</b> I opened presents
<b>j'ai décoré le sapin de Noël</b> I decorated the Christmas tree	<b>je décore le sapin de Noël</b> I decorate the Christmas tree	<b>je vais décorer le sapin de Noël</b> I am going to decorate the Christmas tree

# AO1

Develop ideas through investigations and showing understanding of sources



## Mood board

**Theme** – consider your theme, have you got a set idea already or are you happy to collect a wider range of ideas

**Use a range of sources** – don't find pictures from just one place use different sources like, photographs, wallpapers/fabric samples, lettering, magazines etc...

**Pick a style** – pull it all together with a colour/theme or style to make your page 'work' as a whole

**Apply ideas** – your mood board should be a visual representation of your mind map



## Mind map

**Keywords** – add branches to your mind map that include key ideas and words, using one word for each branch will allow you to develop more ideas rather than using a phrase or sentence

**Central idea** – this is the starting point of your mind map and shows the topic you are exploring. All keywords should link from this idea.

**Include images** – imagery can convey much more than a word or sentence and can help you to develop your ideas as well



## Artist Research and Analysis of Work

There are several things you must include in your research to show understanding of your chosen artist

**Bio** – a quick gathering of facts with the artists birth/death, style, important works

**Collect images** – select images of their work that are relevant and images that appeal to you, comment on why you like them

**Analysis** – To show understanding of the artist you must discuss their work. This will allow you to explore ideas and consider different options before you begin creating your own art work.

**Reproduction** – either copy a small piece of their work or work in the artist's style to show your understanding of their work

## **Content** – Looking at the subject of the work.

What is it? What exactly can you see? What is happening? What does the work represent?  
 What does the artist call the work?  
 Does the title change the way we see the work?  
 What is the theme of the work?  
 Landscape, portrait, journey, moment, memory, event, surreal, fantasy, abstract, message.

## **Form** – Looking at the formal elements.

What colours does the artist use? Why? How is the colour organised?  
 What kind of shapes can you see?  
 What kinds of lines and marks does the artist use?  
 What is the surface like? What textures can you see?  
 What patterns can you see?  
 How big is the work?  
 Light, delicate, layered, strong, rough, dark, peaceful, dripped, textured, scale, vivid, bright.

## **PROCESS** – How the work has been developed and made.

What materials and tools have been used?  
 What is the evidence for how it has been made?  
 Painted, drawn, woven, printed, cast, stitched, constructed, collaged.

## **Mood** – Looking at the communication of moods and feelings.

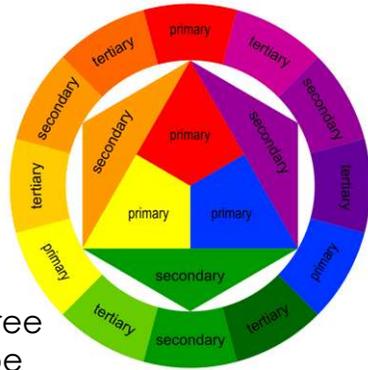
How does the work make you feel?  
 Why do you feel like this?  
 Does the colour, texture, form or theme of the work affect your mood?  
 Quiet, contemplative, thoughtful, hopeful, peaceful, elated, joyful, reflective.

# A02

**Refine ideas by experimenting with appropriate media, materials, techniques and processes**

You don't have to use a specific media in your project, just show some variation.

For example if an artists uses pen, you could try using, pen, pencil, charcoal, biro, coloured pen etc.



## Colour Theory

**Primary colours** are the three main colours, they can't be made, but are used to mix all of the other colours

**Secondary colours** are made by mixing two primary colours

**Tertiary colours** are made by mixing a primary and a secondary colour

**Harmonious colours** are next to each other on the colour wheel

**Complementary colours** are opposite each other on the colour wheel

**Tint** – when you add white to a colour to make it lighter



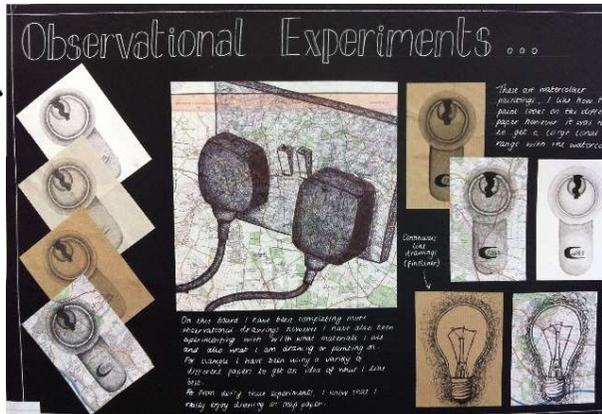
**Shade** – when you add black to a colour to make it darker



## Experimentation

You MUST try things more than once to show improvement and refinement. See how the artist has tried the same sketches in lots of different media and on different surfaces.

Be brave in your use of media, aim to show off your best skills.



<b>Pencil</b>		The basic tool for drawing, can be used for linear work or for shading
<b>Biro</b>		Drawings can be completed in biro and shaded using hatching or cross hatching
<b>Pastel (chalk/oil)</b>		Oil and chalk pastels can be used to blend colours smoothly, chalk pastels give a lighter effect
<b>Coloured pencil</b>		Coloured pencil can be layered to blend colours, some are water soluble
<b>Acrylic paint</b>		A thick heavy paint that can be used smoothly or to create texture
<b>Watercolour</b>		A solid or liquid paint that is to be used watered down and layered
<b>Monoprint</b>		Where ink is transferred onto paper by drawing over a prepared surface
<b>Collograph</b>		A printing plate constructed of collaged materials
<b>Card construction</b>		Sculptures created by building up layers of card or fitting together

<b>Media</b>	The substance that an artist use to make art
<b>Materials</b>	The same as media but can also refer to the basis of the art work eg, canvas, paper, clay
<b>Techniques</b>	The method used to complete the art work, can be generic such as painting or more focus such as blending
<b>Processes</b>	The method used to create artwork that usually follows a range of steps rather than just one skill

# A03

**Record observations, ideas and understandings as you develop your work**

**Take your own photographs** and work from them as much as possible. Taking your own photographs will allow you to create a more personalised response.



Create both primary and secondary studies.

Create **maquettes** (a miniature scale model) in paper, card, etc to show your ideas.



All ideas and observations **MUST** clearly link to your project/theme. No random art work.

You may want to produce another mood board or mind map as you develop your project and narrow down ideas.



## Annotation

Describes writing notes, using images and explain your thoughts to show the development of your work.

**You must annotate and reflect on your work as it progresses to show your intentions and ideas.**

### Step 1 – Describe

What is the image of?

What have you done?

### Step 2 – Explain

How was this work made?

How did you produce these effects?

How did you decide on the composition?

### Step 3 - Reflect

Why did you use these methods?

Why do some parts of the work 'work' better than others?

Why might you do things differently next time?

## How to 'record'

Observational drawing	Drawing from looking at images of objects
Primary observation	Drawing directly from looking at objects in front of you
Secondary observation	Drawing from looking back at images of objects
Photographs	Using a camera or smartphone to take pictures to draw from (this is also classes as a primary observation)
Sketches	Basic sketches and doddles to show undeveloped and initial ideas.
Annotations	Writing about your art work



# AO4

**Present a personal and meaningful response that realises intentions and shows an understanding of visual language**

Telling a story with your art and sketchbook, using your work to convey a message instead of relying on words.

Avoid sticking with your first idea. Sometimes your initial idea is worth pursuing but before a final piece is decided upon you should have considered at least three different design ideas.

## Thinking about your Final Piece

- Use materials and media that you can control well and have practised with.
- Your final piece should show influences from the artists you have studied
- Remember to think about composition rules when designing your final piece

**Present your work well, this doesn't mean fancy background. Just take care on every page.**

### A rough idea

A basic sketch of a final idea

### A visual Maquette

A small image or model created in materials that replicate the end result

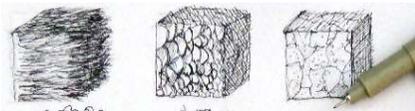
### Final piece

An image or sculpture pulling all prep work together.

## Sketchbook checklist

- Have you demonstrated what the starting point, theme or brief means to you personally?
- Have you established a link between the starting point and your chosen sources?
- Have you reflected your understanding of the social and cultural context?
- Is there a clear link between your sources and your own work?
- Is it clear what ideas or techniques from your sources you have developed?
- Have you selected and presented your studies carefully?
- Made use of your discoveries?
- Made clear links between your work and that of other artists, designers and craftspeople?
- Collected images to show your inspiration and stimuli?
- Made use of drawings, sketches, jottings, photographs and experiments with different media?
- Annotated images to explain how they fit into your development process?
- Demonstrated your understanding through correct use of art and design vocabulary?
- Shown experimentation and selection of the most successful results for your project?
- Organised your recordings and presented them to show and explain your decisions?
- Clearly linked all of your work to your starting point?

## The Formal elements of Art

Tone	How light or dark something is	
Line	A mark which can be long, short, wiggly straight etc...	
Colour	What you see when light reflects off something. Red, blue and yellow are primary colours	
Texture	How something looks or feels e.g. smooth or rough	
Pattern	A symbol or shape that is repeated	
Shape	A 2D area which is enclosed by a line e.g. a triangle	
Form	Something which has 3 dimensions e.g. a cube, sphere or a sculpture	

# Drawing

Another method to consider when drawing is using the grid method.

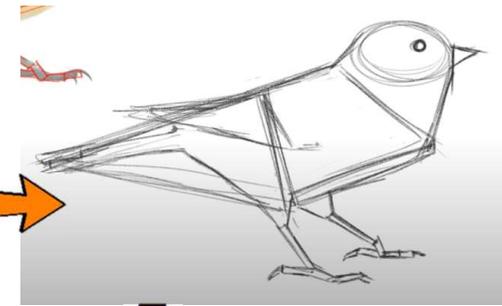
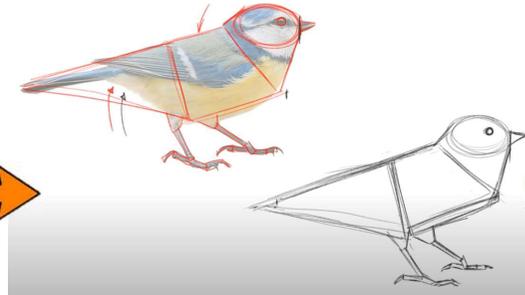
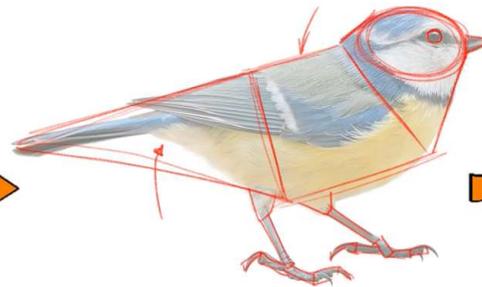
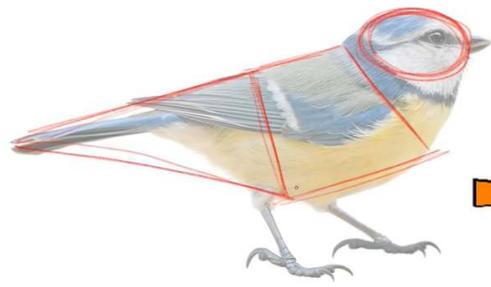
The **Grid method** is a tool used to help you draw whilst keeping everything in proportion. It allows you to break down drawings into lots of small squares. Therefore you can concentrate on smaller sections at a time. The more squares the use the more accurate you can be.



**Constructing a drawing** is important to ensure you keep correct proportion. Use simplified shapes to develop the structure of your drawing. Start with the largest structures first.

- 1. Large rough shapes** – block out the most basic version of your drawing
- 2. Accurate shapes** - Refine shapes so that they resemble the object more closely
- 3. Detail** – add the detailed sections of the drawing like fine lines etc (then apply tone once drawing is completed)

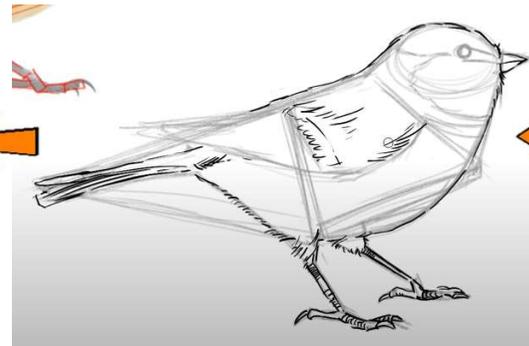
**Take a look at the images below to see how it is done**



Add other structural detail i.e. the wings

Block out the large rough shapes that make up your image.

Draw out those shapes on their own



Develop lines so they more closely resemble they way the final image will look. See how the breast of the bird is now curved, not straight and angular.

Completely remove any construction lines.

Rub out the large rough shapes so you can barely see them and draw using lines that show the texture of the finished object, in this case a bird.

# Adding Tone

## Grades of pencil

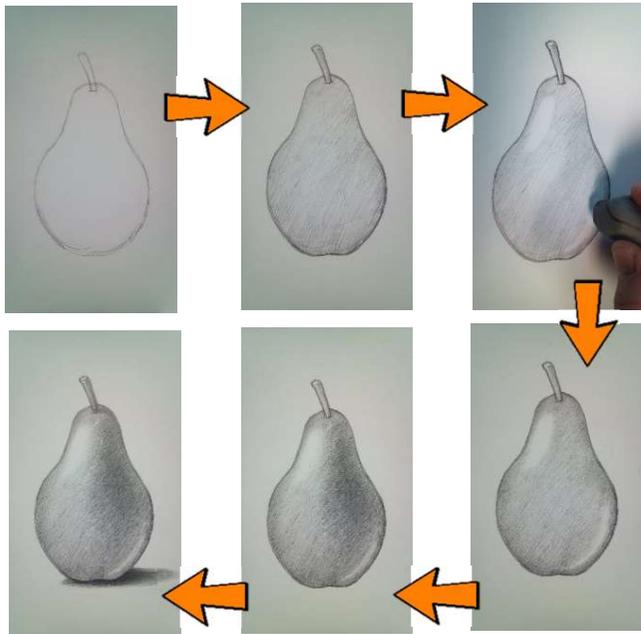
Pencils come in different grades, the softer the pencil, the darker the tone.

H=Hard B=Black

In art the most useful pencils for shading are 2B and 4B. If your pencil has no grade, it is most likely HB(hard black) in the middle of the scale.



When **applying tone** to a drawing you must remember to apply base shades first to add depth and suggest form. Secondly, add mark making to develop the texture and fine details line work to finish.



**Making things look 3D:** To stop drawings looking flat use a range of tone and marks. Pressing harder and light and layering with your pencil creates different tones and adds depth.

**Mark Making:** To make drawings look more realistic try to use different marks on the surface. You can do this by changing the direction, pressure or length of your marks. Mark making can be used in conjunction with shading or separately.



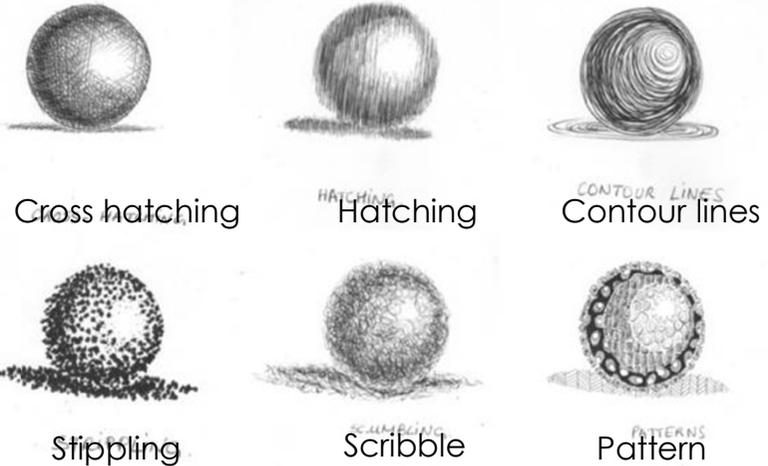
**Directional shading** is shading that follows the contours of an object. Using this method makes your work appear more realistic. Look at the portrait, see how the shading changes direction and curves with the shape of the figure. This technique should be used on all drawings. See how it has been used on the spheres below.



## Tonal shade

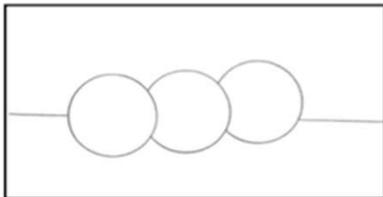
Produce a range of tones by varying the pressure and layering - consider using softer pencils for darker shades

Mark Making - techniques

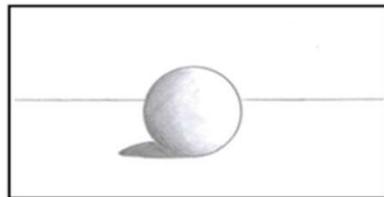


# Composition

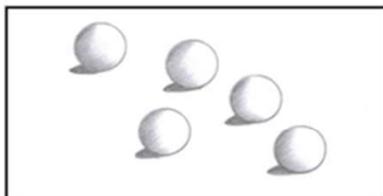
Creating a sense of **space and depth** is important in art work to make it feel sophisticated and well thought out. Knowing how to raise objects over the top of each other is important in communicating space and depth to your viewer.



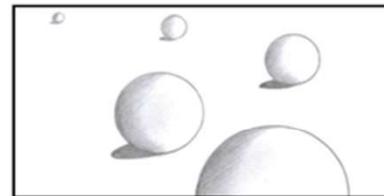
**Overlap**  
One object appears to be behind the other



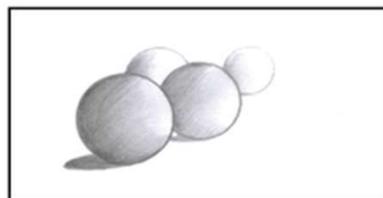
**Shading**  
Light and shadow create the illusion of form and space



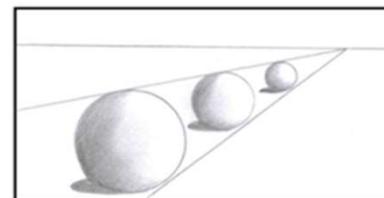
**Placement**  
Objects higher in the picture appear to be in the distance



**Size**  
Small objects look distant, while closer objects should be larger

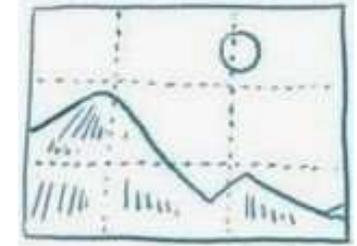


**Value and Focus**  
Lighter values and less details suggest distant objects



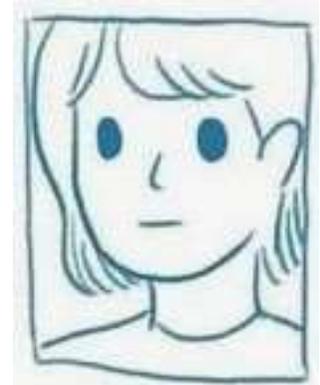
**Linear Perspective**  
Parallel lines and edges seem to go toward one or more vanishing points

**Rule of thirds** – Place focal elements (objects) at 1/3 or 2/3 of the image horizontally or vertically, not in the middle

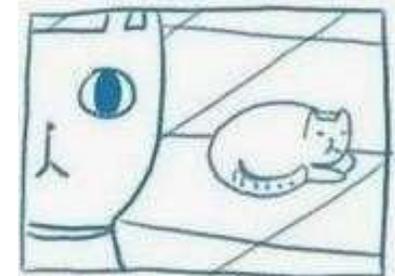


**Repetition and grouping**  
Try grouping objects in odd numbers, this often looks better than an even number of objects.

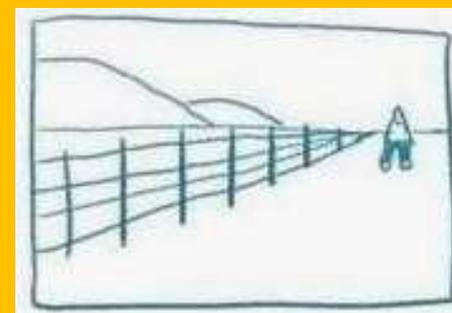
**Simplify and fill** – Enlarge or crop the image to fill the space and draw your viewers attention to that particular object



**Balance elements** – If there is an emphasis on one side of the piece balance it out with smaller objects on the other side.

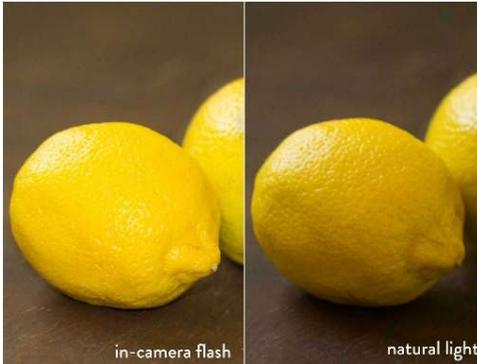


**Line** – Use lines to draw the viewers eye across the work. The lines don't have to be straight, think about using S or C shaped lines.



# Taking a Good Photograph

**Light**  
Use natural light as much as possible. The best times for shooting are sunrise and sunset. As far as possible avoid taking shots in artificial light i.e. bedroom lights or with flash.



Notice that most of the tone is removed with flash on



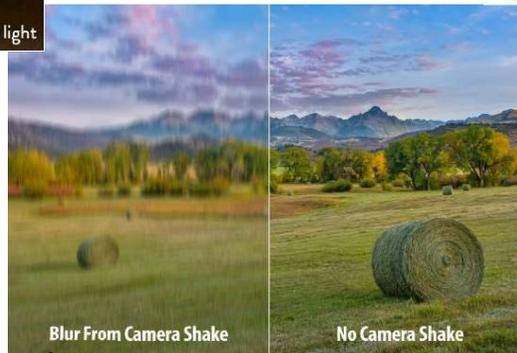
**Noise**  
Avoid digital zoom, it can make images grainy, this is called noise in photography. Try to get physically closer to your subject instead (if you can).



Pro tip: Take lots of pictures from similar angles and only make slight changes with each photograph. Once you have finished capturing you can choose which images are the best.

Taking a good photograph will be key to your project. You will be using these images to draw from. Photography is another great way to record (AO3) the work you are carrying out.

If your picture is blurry, it means you are probably too close to your subject. Move back a little bit until your image becomes sharper.



When there is less light your camera finds it harder to focus and often it will create an image with 'camera shake'. If you need to take an image in low light try to rest your camera of a flat surface to help steady it.

**Think** – don't just point your camera and click. Think about what you want to take a picture of, is it...

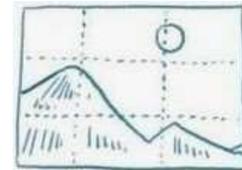
- Texture? Get in really close, just make sure your picture is focused and not blurry.
- A portrait? Make sure nothing distracts from your main subject, try to use a plain background,
- Landscape? Then hold your camera steady, stand far back and line up your scene with the rule of thirds.

**Grid lines** – on most phones/cameras you can go into the settings and add grid lines. Using these grid lines will help you to create a successful composition and therefore photograph. Check out the 'Composition' page and look at the 'rule of thirds'.

To switch the grid on ...

**iPhone:** Go to "Settings," choose "Photos & Camera," and switch "Grid" on.

**Samsung Galaxy:** Launch the camera app, go to "Settings," scroll down and switch the "grid lines" option to "on."



**Tape Masking**

- Tape off sections of your paper with masking tape.
- Paint over the tape and let dry.
- Peel tape off and reveal white paper underneath.



**Blot**

- Use a paper towel to blot up wet paint to reveal white paper underneath.



**Salt**

- Sprinkle salt into a wet (still shiny) wash of watercolor paint.
- The results will appear when dry.



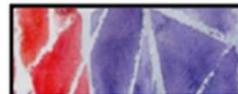
**Painting with watercolour – Tips**

- If water is pooling at all on the paper, you generally have too much water, it will be harder to control the flow of the paint.
- Use two jars of water, once for cleaning your brushes and one with clean water to mix paints.
- Use thicker 'watercolour paper' normal paper will become wavy as it cannot handle so much water.
- Tape down your paper before, during and after painting until your image is completely dry, this way you will have nice flat paintings.
- Let your watercolour dry between layers.
- Use a layering technique, just remember that you cannot put lighter colours over darker colours when using watercolour, work from light to dark.

Consider using some of the watercolour techniques mentioned here to give your work texture and visual interest.

**Crayon Resist**

- Draw with any color of crayon on dry paper.
- Paint wet watercolor over crayon to reveal drawing underneath.



**Wet-in-Wet**

- Apply clean water to your paper.
- Before the water dries, load your brush with paint and touch it to the water. The color will spread quickly.



# Painting

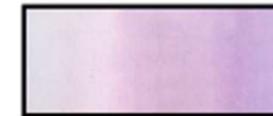
**Dry Brush**

- Start with a dry brush and almost dry paint.
- Run your brush over your paper to create grass or scratchy lines.



**Wash**

- Load your brush with plenty of wet paint. Smooth your brush over the paper with swooping strokes.



**Painting in layers**

Painting, just like drawing (or making a sandwich) needs to be done in layers.

You must start from the base of your image and work forwards. Think about background, midground and foreground

- We can add different materials or techniques individually one over the other,
- waiting until one layer is dry before applying the next.
- Each layer could be the same technique as before, or a different one.
- A layer doesn't have to cover the surface in its entirety.

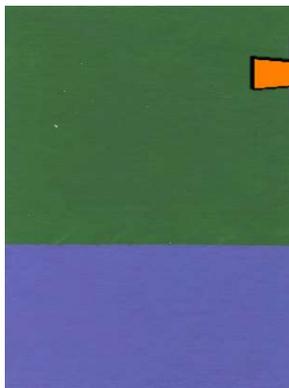
A **layer** can consist merely of one small dab of paint, or can involve thick overlays covering the whole surface. A technique does not have to be applied over the whole surface to qualify as a layer.

**Painting with acrylic - In stages**

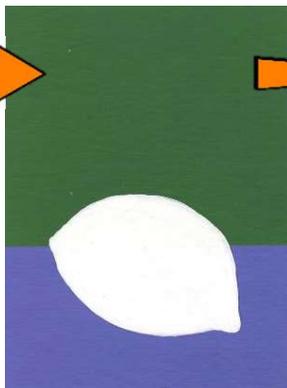
Once you have finished drawing out what you want to paint you should follow these rules when painting with acrylic

Brights: a colour that is lighter than your background

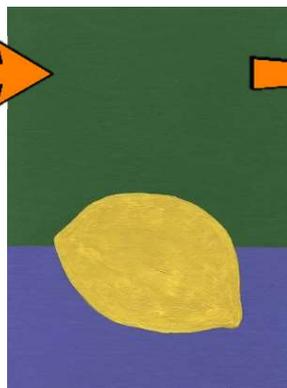
Paint a background



White under brights



Brights over white (block colour)



Apply tonal range, shadows/highlights



Soften edges and blend colours



# Colour Theory

## Colour Theory

**Primary colours** are the three main colours, they can't be made, but are used to mix all of the other colours

**Secondary colours** are made by mixing two primary colours

**Tertiary colours** are made by mixing a primary and a secondary colour

**Tint** – when you add white to a colour to make it lighter

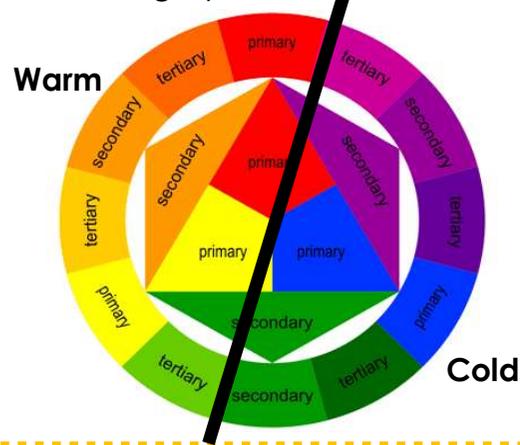


**Shade** – when you add black to a colour to make it darker



**Hue** – any colour that appears on the colour wheel, note that neither black nor white appear on there

**Tone** – used to describe a colour that has had grey added to it.



**Complementary colours** are opposite each other on the colour wheel. When placed next to each other, there is an extremely strong contrasting and vibrant effect. If overused, your painting may become jarring and uncomfortable to look at.

You should select a dominant colour and use the other colour as an accent.



**Harmonious colours** are relaxing colour combinations using colours positioned next to each other on the wheel. Harmonious colour combinations were famously used by impressionist artists such as Claude Monet to create beautiful harmonious paintings. It is often most effective to select one dominant colour, a secondary colour and a third accent colour.

## Colour and emotion

Colour has a powerful influence over human behaviour, to the extent it can manipulate your perception of what is actually there.

- Red: Passion, love, anger and danger
- Orange: Vitality, creativity and activity
- Yellow: Energy, light and hope
- Green: Health, nature and wealth
- Blue: Trust, security and spirituality
- Purple: Creativity, royalty and wealth

We can use these psychological triggers to influence how we want the viewer to perceive the painting. If you want the viewer to have a passionate and aggressive response, then you should be utilizing reds and other warm colours. If you want a calming scene, then greens and blues should be utilized.

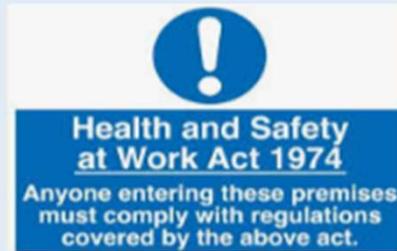
## What can I actually see?

We all have preconceived ideas of what colour an object should be, i.e. a tree is green. But that is not always the case. If you are not careful and do not observe the tree for what it actually is, then you may be drawn towards adding more green than is necessary. This is because we forget to observe and we try to paint from a memory or idea. - **Paint what you see, not what you think.**

Construction- Unit 1 Safety and Security in Construction



Legislation



The Act places a general duty to 'ensure so far as is reasonably practicable the health, safety and welfare at work of all their employees'.

**Employers** must comply with the Act. Examples include: provide and maintain **safety equipment** and safe systems of work, provide **training**, provide a **risk assessment**

**Employees** have specific responsibilities too - they must: take care of their **own health and safety and that of other persons** (employees may be liable), follow the **rules** of the company.

**Provision and Use of Work Equipment Regulations 1998**

The regulations deal with the work equipment and machinery used every day in workplaces and **aims to keep people safe wherever equipment and machinery is used** at work, The regulations aim to ensure that all equipment is: **suitable** for its intended purpose, **regularly maintained** to ensure safety, only used by people who have received adequate **training** inspected by a **competent** worker.

**Working At Height**



**Working at Heights regulation 2005**

They include all work activities where there is a need to **control a risk of falling** a distance liable to cause **personal injury**.

This is regardless of the work equipment being used, the duration the person is at a height, or the height at which the work is performed.

Construction- Unit 1 Safety and Security in Construction



## Manual Handling Regulations 1992

The Regulations define manual handling as: "...any transporting or supporting of a load (including the **lifting, putting down, pushing, pulling, carrying or moving** thereof) by hand or bodily force". The load can be an object, person or animal.

The MHOR 1992 clear **measures for dealing with risks** from manual handling, these are:

**first** : avoid hazardous manual handling operations so far as is reasonably practicable;

**second** : assess any hazardous manual handling operations that cannot be avoided; and

**third**: reduce the risk of injury so far as is reasonably practicable e.g. use of wheelbarrow, sharing load.

**Max load: 25kg**

## Personal Protective Equipment Regulations 2002 (PPE)

Employers have duties concerning the provision and use of personal protective equipment (PPE) at work .

PPE is equipment that will **protect the user against health or safety risks at work**. It can include items such as safety helmets and hard hats, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses.

The Regulations also require that PPE is:

- **properly assessed** before use to make sure it is fit for purpose;
- **maintained and stored properly**;
- provided with **instructions** on how to use it safely;
- **used correctly** by employees.

## Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR)

is the law that requires employers, and other people in charge of work premises, to **report and keep records of**:

- work-related accidents which cause **deaths**.
- work-related accidents which cause **certain serious injuries** (reportable injuries)
- diagnosed cases of certain **industrial diseases**;
- certain '**dangerous occurrences**' (incidents with the potential to cause harm)

Construction- Unit 1 Safety and Security in Construction



Risks—

Key terms:

Likely—The more likely something is, the higher the chance there is of it happening

Severity—The more severe something is, the more high risk it is

High/medium/Low

Control measures

Control measures include actions that can be taken to **reduce** the potential of exposure to the hazard, or the control measure could be to **remove** the hazard or to reduce the likelihood of the risk of the exposure to that hazard being realised.

Could include: Method statements , Safe systems of work , Work permits , **Competent persons** , **PPE**

The Control of Substances Hazardous to Health Regulations 2002 (COSHH) is the law that requires employers to control substances that are hazardous to health. You can prevent or reduce workers exposure to hazardous substances by:

- deciding how to **prevent harm** to health (risk assessment);
- providing **control measures** to reduce harm to health;
- making sure they are used** ;
- keeping all control measures in **good working order**;
- providing **information**, instruction and **training** for employees and others; COSHH cupboard/locked/correct PPE

KNOW YOUR FIRE EXTINGUISHERS - Types and Applications

WATER Fire Extinguisher: Use on wood, paper and fabric fires.

FOAM Fire Extinguisher: Use on most liquid fires and flammable liquids.

POWDER Fire Extinguisher: Use on most liquid fires, flammable liquids and gases.

CARBON DIOXIDE Fire Extinguisher: Use on most liquid fires, flammable liquids and gases.

WET CHEMICAL Fire Extinguisher: Use on most liquid fires, flammable liquids and gases.

USE TO SMOTHER FIRES

Fire blanket

USE TO SMOTHER FIRES

Chip pan fires  
Deep fat fires  
Waste bin fires

CLOTHING FIRES

Wrap tightly round someone whose clothes are burning to extinguish flames

Know your Fire Extinguisher

	WATER	FOAM SPRAY	ABC POWDER	CARBON DIOXIDE	WET CHEMICAL
Wood, paper & textiles	✓	✓	✓	✗	✓
Flammable Liquids	✗	✓	✓	✓	✗
Flammable Gases	✗	✗	✓	✗	✗
Electrical Contact	✗	✗	✓	✓	✗
Cooking oils & fats	✗	✗	✗	✗	✓

**Construction- Unit 1 Safety and Security in Construction**



The Health and Safety Executive (HSE) is Britain's national regulator for workplace health and safety. It **prevents work-related death, injury and ill health**. We achieve this using a variety of methods to influence change and **help people manage risks at work**. These include:

- providing **advice, information and guidance**
- raising awareness in workplaces by influencing and engaging
- operating permissioning and licensing activities in major hazard industries
- carrying out **targeted inspections** and investigations
- taking **enforcement** action to prevent harm and hold those who break the law to account

We take enforcement action if there is harm / potential harm:

- deal immediately with **serious risks** (so they prevent harm) - e.g. **shut down site**, ensure control measures are put into place
- comply with the law
- are **held to account** if they fail in their responsibilities e.g can give fines / **prosecute** businesses

Colour	Meaning or purpose	Instruction and information
Red	Prohibition sign Danger alarm	Dangerous behaviour; stop; shutdown; emergency cut-out devices; evacuate
Yellow Amber	Warning sign	Be careful; take precautions; examine
Blue	Mandatory sign	Specific behaviour or action, eg wear protective equipment
Green	Emergency escape First-aid sign  No danger	Doors; exits; escape routes; equipment and facilities  Return to normal

**The Health and Safety (Safety Signs and Signals) Regulations 1996**

Prohibitory signs



Warning signs



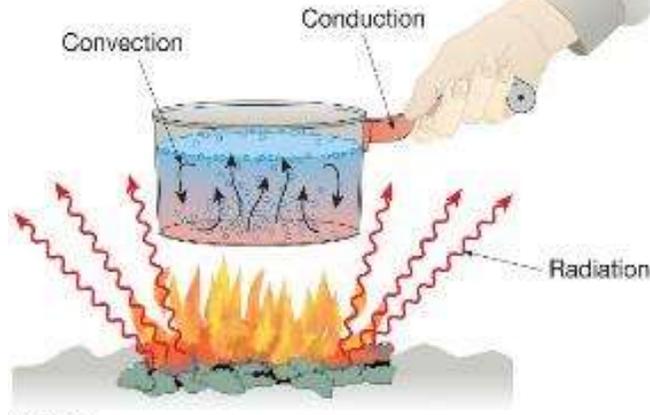
Mandatory signs



Emergency escape or first-aid signs



**Heat Transfer Methods**



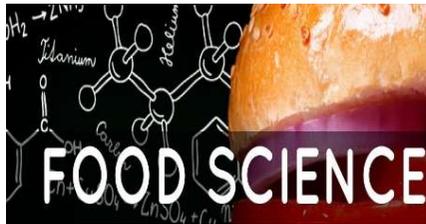
**Convection** - when heat travels through air or water. E.g. in an oven or a pan of boiling water.

**Conduction** - when heat travels by direct contact through solid materials such as food or metal.

**Radiation** - when heat rays travel towards food, e.g. grilling, toasting, microwaving

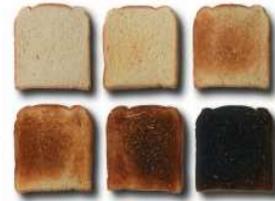


**Properties of Carbohydrates**



**Dextrinisation**

**Dextrinisation** is when dry heat turns starch brown



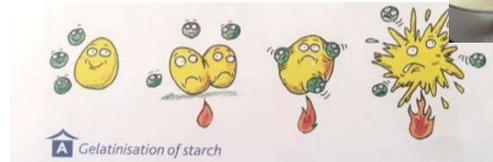
**Starch** broken down into **dextrin**.

**Caramelisation**



**Caramelisation** is when sugar molecules break down at high temperatures turning brown and changing flavour

**Gelatinisation**



Starch granules do not dissolve in liquid. Instead they form a **suspension**

Suspension – a solid held in a liquid

When heated at **60°C**, the starch granules begin to absorb the liquid and swell.

At 80°C the particles will have absorbed about 5 times their volume of water until they burst open and release starch, thickening the liquid.

Gelatinisation is complete when the liquid reaches boiling point, **100°C**



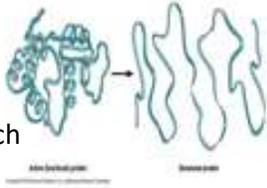
Keyword	Meaning
<b>Coagulation</b>	When a liquid protein is heated and becomes solid. E.g. boiling an egg.
<b>Denaturation</b>	When protein foods are heated causing them to change size, colour and texture. E.g. steak, meatballs, chicken.
<b>Dextrinisation</b>	When dry heat causes starch to turn brown. E.g. toasting bread, baking bread.
<b>Gelatinisation</b>	When liquid is added to starch grains, making them swell. Used to thicken sauces. E.g. custard, cheese sauce.
<b>Plasticity</b>	is the ability of a solid fat to soften over a range of temperatures. The more plasticity a fat has, the easier it is to spread.
<b>Emulsion</b>	keeps oil and water in a stable emulsion (mixture of two liquids).
<b>Shortening</b>	gives food a crumbly texture.
<b>Aeration</b>	When air is trapped in a mixture.
<b>Caramelisation</b>	is when sugar molecules break down at high temperatures turning brown and changing flavour
<b>Gluten Formation</b>	Gluten is a protein found in wheat flours. It forms when water is mixed with flour to make a dough. Gluten molecules coil making the dough elasticated.
<b>Foam Formation</b>	When liquids containing protein are agitated the proteins inside denature, this causes them to stretch and air gets trapped. When the proteins coagulate the air becomes trapped forming a foam.
<b>Enzymic browning</b>	is a chemical process which occurs in some fruits and vegetables. It causes the them to discolour, usually turning a brown colour.

# Properties of Fats

# Properties of Protein

## Denaturation

When liquids containing protein are agitated the protein inside denature, this causes them to stretch and air gets trapped.



When the proteins coagulate the air becomes trapped creating a foam.

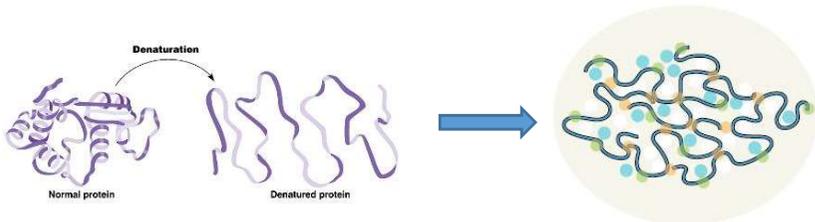
Denaturation of protein molecules can be caused by....

- Heat – frying or boiling an egg
- Acids – adding lemon juice to cream
- Air bubbles – whisked sponge
- Mechanical agitation – whisking egg whites for meringue



## Coagulation

Denatured protein molecules are larger and take up more space....



They knock into other denatured protein molecules and start to join together in large groups – called coagulation



**Shortening** gives food a **crumbly texture**



**Emulsification** keeps **oil** and **water** in a **stable emulsion** (mixture of two liquids).



**Aeration**  
When **air** is **trapped** in a mixture



**Plasticity** is the ability of a **solid fat** to **soften** over a **range of temperatures**. The more plasticity a fat has, the easier it is to spread.



## Raising Agents

**Biological** – Yeast, used in bread making.



**Mechanical** – folding, beating, whisking, sieving, creaming, rubbing in.



**Chemical** - Bicarbonate of soda, baking powder, S.R.flour.



**Steam** – Used in choux pastry, Yorkshire puddings, soufflés.



How are raising agents added into foods?



Mechanical	Manually adding air into food products using different techniques	The processes of sieving, whisking, folding, rolling, creaming all mechanically add in air during food production
Chemical	Adding a chemical which causes a chemical reaction producing CO2 gas. In an oven the CO2 gas expands and pushes up the mixture. Some of the gas escapes but some is trapped in the mixture as it cooks and sets	Examples in food production include baking powder and bicarbonate of soda. Bicarbonate of soda is used to make soda bread, the bread which does not use yeast as the raising agent.  Bicarbonate of soda + cream of tartar = baking powder
Biological	A biological raising agent is added which produces CO2 gas.	The Fermentation process is activated during bread production when yeast is combined with sugar in a warm moist condition. When the fermented yeast is added to the flour and warm liquid it increases in size during the “proving” stage. Example: Bread

Troubleshooting

Problem	Cause	Products This Can Affect
The mixture is stodgy, dry and stiff.	too much flour	cakes, breads, biscuits
The mixture lacks volume, is too runny or too soft.	too little flour	baked products and sauces
The product has a rubbery, greasy possibly crunchy texture.	too much fat	all food products
The product is dry and lack flavour.	too little fat	baked goods
Food is too brown and sweet. Texture is crunchy, crisp and brittle.	too much sugar	baked goods
The product lacks flavour and volume.	too little sugar	baked goods and desserts
The product tastes 'eggy' or has a dense texture.	too much egg	baked goods
The product has not set/has little coagulation.	too little egg	cakes, custard, quiche
The consistency is too runny for a batter or sauce.	too much liquid	baked goods and sauces
The mixture is very dry.	too little liquid	baked goods and sauces
The cake surface is cracked, or the cake has risen over the tin.	too much raising agent	bread, biscuits, cake
The product hasn't risen at all and is very dense.	too little raising agent	bread, biscuits, cake

What Do Ingredients Do?

Ingredient	Purpose
Flour	<ul style="list-style-type: none"> <li>provides bulk and volume;</li> <li>thickens liquids (gelatinisation).</li> </ul>
Fat	<ul style="list-style-type: none"> <li>adds flavour, colour and moisture;</li> <li>traps air.</li> </ul>
Sugar	<ul style="list-style-type: none"> <li>adds flavour, colour and texture.</li> </ul>
Eggs	<ul style="list-style-type: none"> <li>adds flavour, colour and air;</li> <li>helps set the liquid (coagulation).</li> </ul>
Baking powder	<ul style="list-style-type: none"> <li>produces carbon dioxide bubbles, resulting in cakes being able to rise.</li> </ul>
Yeast	<ul style="list-style-type: none"> <li>produces carbon dioxide bubbles, resulting in bread dough being able to rise.</li> </ul>

Function of key ingredients

## The Effect of Cooking on Food- Cooking methods

Dry Heat Methods	Method	Explanation	Advantage	Disadvantage	Example
	Baking	Food is cooked in the oven using dry hot air.	More than one item can be cooked at once; good colour and texture; exterior is browned and adds flavour.	Specific cooking times needed; needs to be baked at correct temperature.	cakes, puddings, bread, biscuits
	Roasting	Food is cooked using dry air in the hot oven. Basting with fat prevents the food drying out.	Good flavour; crisp texture; other products can be cooked at the same time.	Can be time-consuming; meat can get chewy and hard if cooked at too high a temperature.	joints of meat
	Grilling	Food is cooked by radiant heat – grill is either above or below the food.	Healthy – fat drains off quickly.	Can easily burn if left too long.	sausages, bacon, cheese on toast
	Toasting	Dry radiant heat is applied – brief exposure to heat from an oven.	Toasting lowers Glycemic Index; flavours can be enhanced.	Needs monitoring to avoid burning.	bread, nuts, seeds, spices

Frying Methods	Method	Explanation	Advantage	Disadvantage	Example
	Shallow Frying	Food is cooked in a shallow amount of hot fat.	Quick; uses minimal fat.	Will cook small pieces of food only; high safety risk – splashes can cause injury and fire.	chicken, steak, sausages, vegetables
	Deep Frying	Food is plunged into very hot fat.	Gives a golden appearance and crunch; very quick.	High safety risk due to overheating causing fire; Very unhealthy – foods absorb fat.	chips, , chicken pieces, fish
	Stir Frying	Small pieces of vegetable and meat are cooked quickly in a small amount of hot oil.	Quick cooking method; vegetables remain crunchy.	Food needs to be kept moving to cook through; heavy preparation needed before cooking.	thin strips of meat, fish and vegetables

Moist Heat Method	Method	Explanation	Advantage	Disadvantage	Example
	Boiling	Food is cooked in boiling water.	Quick; Healthy; No added fat; Good for starchy foods.	Water soluble vitamins can be lost; food can get soft; not suitable for meat.	potatoes, rice, pasta
	Simmering	Food is cooking in a lightly bubbling stock, water or juice.	Good for tender pieces of food Quick.	Water soluble vitamins can be lost; tender foods can fall apart.	meat, fish, eggs, fruits, vegetables
	Poaching	Food is cooked in a small amount of simmering liquid – usually water or milk.	Food is cooked gently; Quick; Healthy.	Water soluble vitamins can be lost; food can fall apart.	fish, eggs, meat
	Stewing	Food is cooked slowly in a liquid to develop flavours.	Tough meat is tenderised; Water soluble vitamins are absorbed into the sauce.	Needs planning – can take 2-3 hours.	stew, casserole, fish, meats, pulses, vegetables
	Braising	Meat has been seared and added to vegetables in a liquid to be cooked in the oven.	Meat is tenderised; Good flavour; Water soluble vitamins are absorbed into the sauce.	Must have a well fitted lid; can take 1-2 hours.	meat, beans, vegetables
	Pressure Cooking	Cooked under pressure in a pressure cooker – temperature of liquid rises quickly from 100-120°C	Food cooks quickly; Meat is tenderised; Water soluble vitamins are not easily lost.	Easy to overcook the food.	meat, vegetables, soup, rice, steamed puddings
	Steaming	Food cooked in the steam of boiling water.	Healthy; Water soluble vitamins are not lost; Food easy to digest.	Steamer needs supervision and filling up; can take longer than boiling.	meat, fish, vegetables
	Blanching	Food plunged into boiling water, then removed and put into cold water.	Healthy; Can prepare vegetables for freezing; Protects the loss of colour.	Vitamins and minerals can be lost.	leafy vegetables
Sous Vide	Food is vacuum-packed and heated in water.	Flavour, aroma and nutrients are preserved.	Water bath machine is expensive; food does not brown.	meat, fish	

## Music BTEC Unit 1: The Music Industry

### VENUES TYPES –

**LARGE/MULTI-PURPOSE:** Arena, Stadium, Large outdoor festivals, Large Theatres  
**SMALL:** Pub, Club, Small Theatre, School Hall

### HEALTH & SAFETY AT VENUES :

- Heating, lighting, ventilation
- Safe electrical equipment
- Hygiene (toilets, clean drinking water)
  - First Aid Qualified Staff
  - Emergency Exits
  - No tripping hazards
    - Adequate
    - Disables Access
- Security Guards (SIA license)
  - No Smoking

### ROYALTY COLLECTION AGENCIES

## PRS

Performing Rights Society represents their members' performing rights, whenever a piece of music is performed or played in any public space or place outside of the home. They then collect royalties for this in the form of licenses.

Phonographic Performance Limited licenses the right to play recorded music and music videos in public. They then collect royalties for this.

## PPL

## MCPS

The Mechanical Copyright Protection Society represents their members' mechanical rights, whenever a piece of music is reproduced as a physical product. They then collect royalties for this.

### UNIONS

## MU

The Musicians' Union is an organisation which represents over 30,000 musicians working in all sectors of the British music business.

Musician

Composer/  
Songwriter

Record Producer

Session Musician

## Equity

Equity is the UK trade union for professional performers and creative practitioners. It represents artists from across the entire spectrum of arts and entertainment.

Musician

Session Musician

Broadcaster

## BECTU

The Broadcasting Entertainment Cinematograph and Theatre union is the UK's media and entertainment trade union. It represents 26,000 members who work in broadcasting, film, theatre, entertainment, leisure and interactive media.

### TRADE BODIES

## MPG

The Music Producers Guild represents the interests of all involved in the production of recorded music in the UK

## APRS

Association of Professional Recording Services represents those who work in the audio industry in the UK

## PLASA

Professional Lighting and Sound Association represents those who supply technologies and services to events in entertainment in the UK

**RECORD COMPANIES**



**Advantages of a major record label are:**

- They have a great deal of money at their disposal.
- They have many connections with other labels and artists
- They have great links when it comes to promotion of an artist
- Because of their large size, they can get the best deals on manufacturing, advertising and links to media outlets.

**Disadvantages of a major record label are:**

- Difficult to stand out in such a big pool of artists
- Deals that are balanced in the favour of the record label making money as opposed to the artist.

**Promotion Companies**

Promotion companies support the marketing and promotion of an artist and encourages publicity of an artists product for public awareness. This can include live shows, record signings, public appearances etc. Many of the big record labels will have a promotions company within their label rather than outsourcing to other companies.

**Lighting and Sound Equipment**

- Company will have technical expertise with the equipment and can also give advice about best set up or needed specifications.
- The equipment will be higher quality and looked after properly.
- Engineer to take care of sound/lights so that the artist can focus on the music

**Transport**

- They will transport equipment when on tour so equipment is always at the venue when needed.
- Transport company may provide Roadies to carry and install equipment.
- Hire a bigger live in coaches for tours around the country or abroad.

**PUBLISHING**

**Advantages of a major publishing house are:**

- Major publishing houses are better equipped to distribute music, through funds they have available and already establish connections.
- The music published is associated with a certain quality and can be packaged and printed to reflect this.
- There are lot more opportunities for marketing and promotion as the publishing house will do this for you and have greater funds to do this more extensively.
- More opportunity to make significant amounts of money



Published Sheet Music

**Disadvantages of a major publishing house are:**

- Usually need to go through an agent who will take a percentage of the money you earn.
- It is harder to have music published when the company is large
- They may insist on further editing to your music and certain changes made.

Self Publishing (Online)

**Advantages of self publishing are:**

- Don't need to go through an agent as you can send your work directly to them
- You are more in control with the editing process
- It can be a stepping stone to a larger company
- May cater to a specific genre that is different from the style required of the major publishing houses.

**Disadvantages of self publishing are:**

- Less marketing and promotion through online publishing. This will need to be carried out by the composer
- You are likely to make less money from online publishing, especially in the short term.
- Not the same possibilities of distribution of your work.

**Advantages of an independent record label are:**

*How does this compare to major record labels*

- There are usually less artists so there is more time that can be spent with the artist
- The contracts are more fair to the artist, giving them a more even split of the money made

- Due to more time spent with the artist, a closer personal relationship can exist
- The artist can have more creative freedom with the songs chosen and the sound of the music.

**Disadvantages of an independent record label are:**

- Less funds available to make records
- Less funds to publicise and promote a record
- Organisation of record label can be difficult due to less employees and more informal nature
- Can have less contacts with the media for advertising and promotion.

*Which label would you choose?*

## Musician

A musician is someone who performs music through the playing of an instrument or singing. Musicians play many different styles of genre's, from Jazz to Pop, from Classical to Folk.

Musicians main responsibilities are:

- Train and practise regularly to keep skills to a high standard
- Turn up to rehearsals on time and ready to play
- Look after their instrument or their voice
- Learn new music for a show.



Ed Sheeran  
(Guitarist and Vocalist)

## Studio Manager

A Studio Manager makes sure that the studio is organised, in terms of bookings, equipment and administration. They are involved in the business side of the operations and making sure that they keep existing clients satisfied and attract new business to the recording studio.

Studio Managers main responsibilities are:

- Ensure that the studio is run effectively and that it is financially profitable
- Schedule times and liaise with clients
- Employ session musicians and engineers
- Promotion and marketing of studio
- Check Health and Safety is in place to safeguard clients and employees

What health and safety concerns are there at a studio?



Abbey Road Studios  
(London)

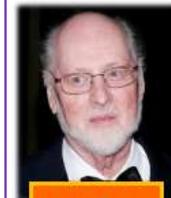
## Composer/Song Writer

A Composer is someone who writes music. This can be in the form of music written for an orchestra or brass band, music written for film or television, electronic music written on computers or through song writing.

Composers main responsibilities are:

- Compose music for a TV programme (quiz show, soap, commercial)
- Compose songs for singers
- Compose music for a special event (coronation, Olympics)
- Keep to a deadline
- Work with the performer so that the song/composition is at their ability level of singing/performance (correct range)

What ways can a composer/song writer earn money?



John Williams  
(Film Composer: Star Wars)

## Live Sound Technician

A Live Sound Technician controls the sound at live events such as theatre performances and music concerts. They operate microphones, amplifiers and control desks to balance the sound levels, as well as providing background music and sound effects.

Live Sound Technicians main responsibilities are:

- Choose suitable microphones and equipment and make sure these are looked after.
- Position and rig-up microphones
- Do sound-checks
- Operate the sound desk during shows/recording



Live Sound Technician at a Concert

## Promoter

A Promoter is typically hired as an independent contractor by music venues, earning an agreed-to fee or royalties. They work with agents, or in some cases, directly with the bands, and with clubs and concert venues to arrange for a show to take place. Promoters then are in charge of making sure the word gets out about that show.

How would a promoter go about arranging a show?

Promoters main responsibilities are:

- Work with venues to arrange for a show
- In charge of 'putting on' the show
- Work with artists' management
- Promote the show through advertisement and publicity



Local Flyer to Promote a Concert

## Sound Engineer

A Sound Engineer is required to assemble, operate and maintain the technical equipment used to record, amplify, enhance, mix or reproduce sound.

Sound Engineers main responsibilities are:

- Planning recording sessions with producers and artists
- Setting up microphones and equipment in the studio
- Making sure the volume and recording levels are set correctly
- Operating recording equipment and adding effects
- Recording each instrument or item onto a separate track
- Mixing tracks to produce a final 'master' track

How does this compare to a Live Sound Technician?



A Sound Engineer Recording a Drum Track

## Marketer

A Music marketer is someone who is in charge of raising awareness of an artist and creating a brand that can be easily recognisable to the public. In order for the artist to be popular, a marketer must help create a fan base through various types of media and publicity campaigns.



Social Media used to Market an Artist

Marketers main responsibilities are:

- Design and implement marketing (i.e selling) plans: album sales, streams
- Gather prices for advertisements and promotions
- Devise promotional events, giveaways, sponsorships
- Have a radio/ online campaign for an artist
- Create the artist's image/brand

Why is a brand/image important?

## Venue Manager

The venue manager must ensure the smooth running of their venue and make sure that the venue is a profitable business. This involves working closely with artists, ensuring the quality of the music performed and negotiating fees for the use of the venue.

Venue Managers main responsibilities are:

- Ensure that all services are opened and fully functional during scheduled times
- Check Health and Safety is in place to safeguard clients and employees
- Give consistent and excellent level of service to clients
- Book artists for the venue.
- Assist with preparations of shows and supervise the whole process

What financial aspects does the Venue Manager need to consider?



O2 Academy Shepherd's Bush  
(London)

## Mastering Engineer

A mastering engineer is a person skilled in the practice of taking audio (typically musical content) that has been previously mixed and preparing it for use in distribution, whether by physical media such as a CD, vinyl record, or as some method of streaming audio.

Mastering Engineers responsibilities are:

- Complete the audio mastering process for an album
- Prepare and transfer audio from one format to a desired master format
- Refine the sound quality and make subtle changes to create an appealing sound

Why is a Mastering Engineer important?



A Mastering Engineer Making Subtle Changes to the Audio

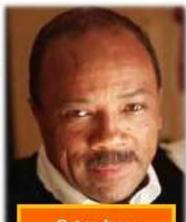
## Record Producer

A Record Producer (or Music Producer) has a very broad role in overseeing and managing the recording (i.e. "production") of a band or performer's music. They have a lot of responsibility over the final recording made and are often likened to the director of a film in terms of their importance and overall creative input.

Record Producers main responsibilities are:

- Oversee and manage the recording of an artist's music
- Gather ideas for the project and select songs
- Hire session musicians for the project
- Coach the artist in the studio
- Control the recording session
- Supervise the entire process through mixing to mastering

What coaching would they give the artist? And why?



Quincy Jones  
(Record Producer: Thriller)

## Music Journalist/Blogger



Taylor Swift on the Cover of Rolling Stone

Music journalism is reviewing and reporting about popular music topics, including pop music, rock music, and related styles. Music journalism is an aspect of entertainment journalism, covering popular music and including profiles of singers and bands, live concert, and album reviews.

Music Journalists main responsibilities are:

- Write reviews about an artist's concert and album
- Attend shows, concerts, events and interview people
- Listen to CDs, online music, new talent to stay up to date with the latest music scene

Why should artists do interviews?

## Session Musician

A session musician is a musician that is called in to play on recordings or in bands at short notice. They must learn and play parts almost immediately and should therefore be musicians of a high ability and have very good performance skills.

Venue Managers main responsibilities are:

- Turn up on time to recording sessions or performances
- Rehearse music and keep instrumental level high
- Follow instructions given by producer/conductor
- Bring instrument and keep it in good condition for regular playing
- Contribute partly, at times, to the writing of an arrangement

Why would anyone want to be a session musician?



Session Musicians Recording Their Part

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Why should artists do interviews?

## Software Programmer/App Developer



Computer Sequencing Software

A programmer, computer programmer, developer, coder, or software engineer is a person who writes computer software. Software is extremely beneficial to the music industry and it has made it easier than ever to set up home studios and produce music in a more accessible way.

Programmers main responsibilities are:

- Create apps, musical programmes: sequencing (Logic), notation software (Sibelius), music games
- Up date the programme regularly
- Create computer programmes that assist musicians with their training (aural tests, music theory)

How has software benefitted the industry?

## Roadie

The road crew (or roadies) are the technicians or support personnel who travel with a band on tour and handle every part of the concert productions except actually performing the music with the musicians

Roadies main responsibilities are:

- Carry equipment
- Set up equipment before event
- Look after the equipment
- Pack away the equipment at the end of the event



## CD/Vinyl Manufacturer

A Manufacturer is someone who takes the final master copy of a record and presses it onto CD or Vinyl to be distributed to retail stores for consumers to purchase.

Manufacturers main responsibilities are:

- Master CD's/Vinyl's of high quality
- Transport to distribution outlets (stores or online)
- Duplicate CD's/Vinyl's



CD Manufacturing

What dangers does a Manufacturer face?

## DJ

DJs play music for audiences at live venues. DJs use various formats including vinyl, CD or MP3, and a range of equipment such as turntables, mixers, microphones and amplifiers. DJs develop the skill to seamlessly transition from one recording of a song to another by using turntable skills that involve the simultaneous use of two record turntables and a DJ mixer

DJ's responsibilities are:

- Play and mix records in clubs or bars, to create atmosphere or keep people dancing
- Choose music to suit the audience's taste and the venue's music policy
- Create their own sounds by manipulating beats, using samples, adding extra music and sound effects
- Work with an artist who raps or sings over the music.

What other job roles could a DJ become involved in?



David Guetta (DJ)

## Retailer

A Retailer is someone who works in a business that sells music to consumers. This could be in the form of physical copies sold through high street shops or through online stores where music can be downloaded or streamed.

Examples of Retailers:

- Online: iTunes, Amazon, Spotify.
- Shops: HMV, Fopp, specialist record shops.



Music Retailer (HMV)

Why are high street retailers under threat?

## Distributor

A music distributor links a record label or independent musical group to consumers. Their job is to sell recordings and to increase the group's visibility and popularity by convincing stores to stock and promote its recordings. Much of that comes through the distributor's sales reps, who build relationships with the chains and independent stores.

Distributors main responsibilities are:

- Convince stores to sell their clients album.
- Work with stores to promote their clients album
- Build good relationships with stores for future sells.



Distributing to Online Retailers

What skills do you need to have to build relationships with people?

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Distributing to Online Retailers

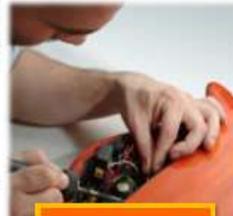
What skills do you need to have to build relationships with people?

## Instrument Technician

Instrument Technicians are those that have specialist knowledge of specific instruments and can therefore support with the use of them. They also have knowledge of how they should be used or the best configuration to get the best sound.

Instrument Technicians main responsibilities are:

- Look after the instrument
- Fix the instrument when broken (e.g. broken strings)
- Give advice regarding best use of equipment



Instrument Technician Repairing a Guitar

What expertise would you need to have and know?

## Artists and Repertoire (A&R)

Artists and repertoire (A&R) is the division of a record label or music publishing company that is responsible for talent scouting and overseeing the artistic development of recording artists and songwriters.

A&R main responsibilities are:

What would they look for in new talent?

- Scouting for new talent and sign to a record label
- Oversee all the aspect of the process from delivery to finished recordings
- Development of artist as they grow and mature
- Manage the recording process
- Help find songs appropriate for the artist



Simon Cowell (A&R Exec. One Direction)

## Artistic Manager/Talent Manager

A artistic manager, also known as a talent manager, band manager or music manager, is an individual who guides the professional career of artists in the music industry.

Artistic Managers main responsibilities are:

- Organise and confirm show dates and tours
- Liaise with record companies
- Assist with studio planning
- Support artist on a personal level, with advice on lifestyle choices
- To maintain the high standard needed of the artist
- Exploit marketing opportunities.



Scooter Braun (Talent Manager: Justin Bieber)

Why can't artists manage themselves?

# A - Design A Personal Fitness Training Programme

## Physical-Related Fitness Components That You Should Look To Improve

**Aerobic Endurance:** The ability of the heart and lungs, to work for a long period of time.

Sports: Long distance running, Football, Road Cycling.

**Muscular Endurance:** The ability of a muscle, to work continuously without tiring. Sports: Hockey, Rugby, Endurance Sports

**Flexibility:** The range of movement at a joint.

Sports: Gymnastics, Dance, Diving.

**Muscular Strength:** The maximum amount of force a muscle can produce in a short period of time.

Sports: Rugby, Powerlifting, Boxing.

**Speed:** The ability to cover distances quickly. 3 types of speed; Accelerative Speed, Pure Speed & Speed Endurance.

Sports: Athletics, Football, Rugby.

**Body Composition:** The ratio of Fat to fat-free mass In the body.

Different sports will need a different body fat percentage



## Skill Related Fitness Components That You Should Look To Improve

**Agility:** Ability to change direction quickly and efficiently

Sports: Tennis, Rugby, Football.

**Balance:** Ability to maintain centre of mass over a base

Two types; Static and Dynamic Balance.

Sports; Gymnastics, games sports.

**Co-Ordination:** Smooth flow of movement to be able to a motor skill fluently.

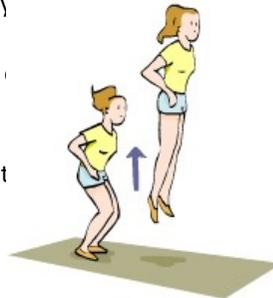
Sports; Tennis, Rugby, Gymnastics.

**Power:** Combination of Speed and Strength.

Sports; Long Jump, Rugby, American Football.

**Reaction Time:** The ability to react quickly to a stimulus.

Sports; Sprinting, Tennis, Table tennis.



## Principles of Training

For any training to be successful, it must stick to the following principles;

**Specificity:** Tailoring training to your goals and sport.

**Progressive Overload:** Gradually increasing exercise intensity to cause adaptation.

**Variation:** Changing the type of training, to increase motivation.

**Adaptation:** Changes in the body caused by exercising at a high intensity.

**Reversibility:** When you stop training, you lose any fitness adaptations you will have gained.

**Rest & Recovery:** The time required to allow your body to repair any damage sustained during training/competition. The body will repair itself and become stronger than before.

**Frequency:** How often you train

**Intensity:** How hard you train

**Time:** How long you train for

**Type:** what type of training do you do



Frequency



Intensity



Time



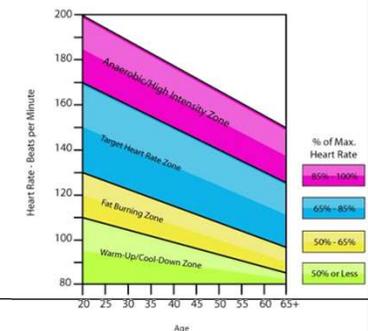
Type

## Exercise Intensity

Measure how hard you are training by using your heart rate (BPM). Maximum heart rate = 220 – age Target heart rate zone for Aerobic training 60-85% of your maximum heart rate.

Therefore, you should be training hard enough, that your heart rate is between 60-85% of your maximum heart rate. This will cause your body to adapt.

Borg's RPE scale can also predict intensity and heart rate.  
RPE X 10 = HR



## Principles of fitness training programmes

When designing training programmes, there are two key questions:

1. What am I trying to improve?
2. How am I going to improve it?

You need detailed knowledge of different components of fitness and the different training methods used to improve them.

Before you can design a training programme, you will need to set individual goals. Without these, you will not know what to direct your training towards. The programme must be flexible but capable of meeting these goals and personal needs. Each individual has different ambitions and aspirations and your programme should reflect these.

The athletes aims and objectives should be broken down into short-term (up to one month), Medium term (One to three months) and long term goals (three months to one year). Goals should be

## All the targets that you set must be SMARTER targets:

- **Specific** – they say exactly what you mean (e.g. to improve flexibility in the hamstring muscle group)
- **Measurable** – you can prove you have reached the (e.g. increase flexibility by 5cm using the sit and reach test)
- **Achievable** – they are actions you can achieve (e.g. practice and improve flexibility through training)
- **Realistic** – you will be able to achieve them but they will still challenge you (e.g. the increase in flexibility must be manageable – a 20cm increase in two weeks is not achievable)
- **Timed** – they have deadlines (e.g. to reach target within six weeks)
- **Exciting** – ensure you look forward to and never get bored with your training programme.
- **Recordable** – keep accurate records of everything you do in a training diary. This will be an excellent resource and source of inspiration to keep you fit and healthy.

## A - Design A Personal Fitness Training Programme

### Training Methods for physical fitness-related components

To develop different components of fitness to meet the needs of different sports you need to use a variety of training methods. These can be indoor or outdoor environments or using a range of equipment.

### Aerobic Training Methods

Three most common methods used to improve aerobic endurance are:

- **Continuous Training**
- **Fartlek Training**
- **Interval Training**
- **Circuit Training**

There is insufficient evidence to suggest which training method is best, but all will lead to improvements.

Aerobic training is often used by people who want to lose or manage their weight by reducing their body fat content. Body fat is reduced because training increases levels of hormones epinephrine and norepinephrine which help break down fat to be used as an energy source.

Aerobic endurance training can also help to improve blood volume, improve mitochondrial size and density, develop neuromuscular patterns and improve muscle tone.

### Types of Aerobic Training

**Continuous Training** – Also known as a steady-state or long, slow distance training – athlete trains at a steady pace over a long distance. Intensity should be moderate (equal to or less than 70% of VO<sub>2</sub> max) over a long distance and time.

This method is suited to long-distance runners and swimmers. Due to lower level of intensity, an athlete can train for longer. It can also be use for:

- Beginners who are starting structured exercise
- Athletes recovering from injury
- Specific groupings of individuals such as children or elderly people.

**Disadvantages** – Risk of injury when running long distances on harder surfaces. It can be boring and it is not always sport specific with the sport specific benefits being small.

Continuous Training can be performed in a gym using a range of cardiovascular equipment (treadmills, cross-trainers or exercise bike) or outdoors at a suitable park or track area.

### Circuit Training -

A number of different stations will be set up around the room. Each station contains a different activity. Individuals are set a time limit to do these exercises. Between stations there should be a rest period.

A circuit can be designed to improve aerobic endurance, muscular endurance or strength or a combination of all three. To avoid fatigue, the stations should allow consecutive exercises to use different muscle groups.

To increase progression and overload, the individual may wish to:

- Decrease rest periods
- Increase the number of stations
- Increase the number of circuits
- Increase the time spent at each station
- Increase the number of circuit sessions per week.

Circuit training can be performed in a gym although space can be an issue. Circuit training can use cardiovascular equipment, free weights, resistance machines or simply body weight exercises at stations. Circuit training can also be performed outdoors at a suitable park or track area as long as you have mobile equipment.

### Fartlek Training –

Based on running outdoors and intensity is varied depending upon athletes requirements. The intensity is changed by varied terrain such as sand, hills, soft grassland or woodland.

Some of the benefits of fartlek training are improving aerobic endurance, muscular endurance and improving balance and **proprioception** in the ankle, knee and hip all of which have a variety of benefits ranging from improved sport performance during a game to helping with injury rehabilitation.

Can be more useful than continuous training because it can be individual and sport specific. This methods uses both aerobic and anaerobic endurance and can involve changes in direction, so it is useful for team players as it can mimic the sport.

In fartlek training there is no rest period but the athlete has more control and can decrease intensity at any time to rest. The benefits are:

- Less technical than other methods making it easier to use.
- Athletes can control their own pacing
- Boredom is reduced.

Can be performed in a gym using a range of cardiovascular equipment (treadmills, cross-trainers or exercise bike) so long as speed, gradient and resistance can be changed or outdoors at a suitable park where intensity can be changed by varying terrain.

**Interval Training** – improves both aerobic and anaerobic endurance by varying the intensity and length of work periods. Athletes perform a work period, followed by a rest period, before completing another work period. This can be repeated many times, depending upon fitness level.

When designing an interval training programme you should consider:

- The number of intervals (rest and work periods)
- Intensity of the work and rest intervals
- The duration of the work and rest intervals.

Sets and reps are common terms that provide structure and organization when referring to the number of exercises in the training programme.

**Repetitions (REPS)** – how many times you perform an exercise.

**Set** – how many times you repeat that exercise for the set number of reps.

Can be performed in a gym using a range of cardiovascular equipment (treadmills, cross-trainers or exercise bike) so long as speed, gradient and resistance can be changed or outdoors at a suitable park or track area where running or cycling can be undertaken safely.

### Maximum heart rate (MHR) and training zones

MHR is used to calculate how hard you should work your heart to develop either aerobic or anaerobic fitness. (MHR) can be calculated as follows:  $220 - \text{age} = \text{MHR}$ .

✓ **Warm-up or cool-down zone** = 50 per cent of MHR (mainly for sedentary / unfit individuals new to training).

✓ **Activity recovery zone** = 60 per cent of MHR (useful for aiding recovery, removing waste products; the next step for those new to training).

✓ **Fat burning zone** = 60–70 per cent of MHR (required for fat burning management and for athletes training for long distances).

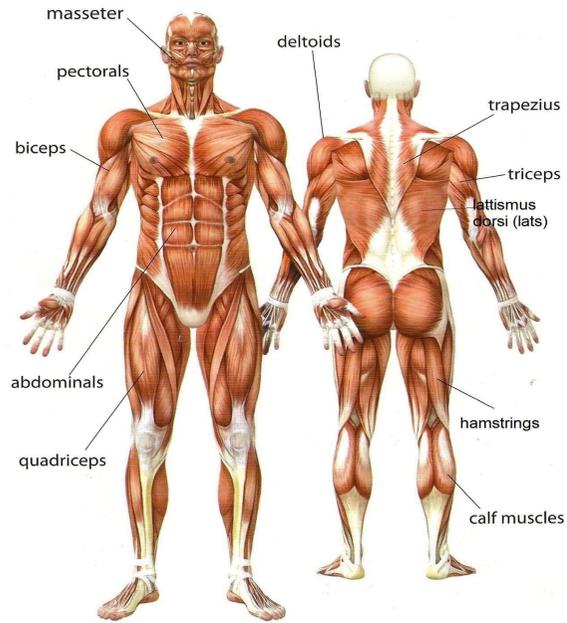
✓ **Aerobic fitness zone** = 70–80 per cent of MHR (where you develop aerobic endurance; it is suitable for active / trained individuals).

✓ **Target heart rate** = 60–75 per cent of MHR (this has the greatest benefit for cardiovascular health).

✓ **Peak performance zone** = 80–90 per cent of MHR (highest zone of cardiovascular training, which is geared towards competitive sport and will help develop speed).

✓ **Anaerobic threshold** = 90–100 per cent of MHR (this is the point where you can no longer meet your aerobic requirements, so the body uses your anaerobic systems. Training at this level is only suitable for advanced athletes).

## B- Know About The Musculoskeletal System And Cardiorespiratory System And The Effects On The Body During Fitness Training



### Short-term effects of fitness training on the musculoskeletal system:

A warm up must be used within your training plan and it must include three phases:

**Pulse Raiser:** To raise HR and speed up oxygen delivery to the muscles. Examples, jogging up and down a pitch.

**Stretching:** Stretching the muscles and sport tissues you are about to use and increasing their elasticity and range of motion. For example lunges, hamstring stretch.

**Sports Specific:** These are more intense practices relating to the main session such as dribbling if you are about to play basketball, or complete a session on coordination.

### Planning for progressive overload to encourage micro tears in muscle fibres

Each session you must ensure that you are progressing over time. This means that you are placing your muscles under stress to cause microtears to happen within the muscles. These tears will then repair over time and become stronger. If you don't work at a high enough intensity in the first place during your training sessions you will not progress.



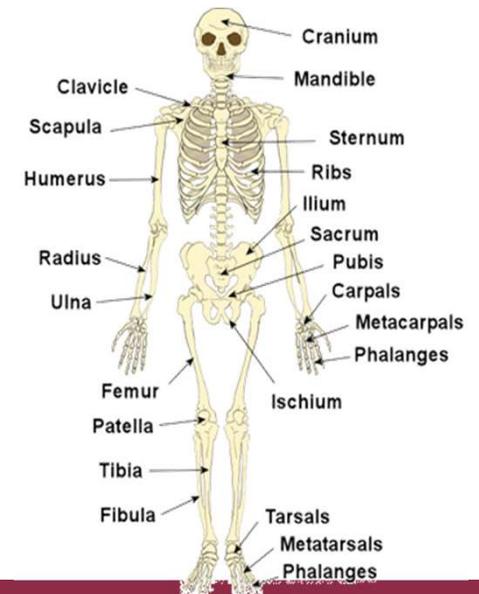
### Synovial Joints:

**Knee:** Hinge Joint – Flexion and extension are available at the knee, by the use of the quadriceps (Knee flexion) and Hamstrings (Knee extension).

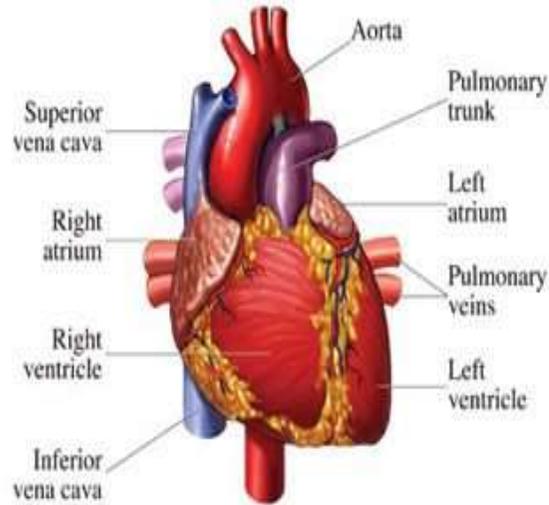
**Elbow** Hinge joint – Flexion and extension are available at the elbow by the use of the triceps (Elbow extension) and Biceps (Elbow Flexion)

**Hip** Ball and Socket joint – Flexion, extension, rotation circumduction, abduction and adduction are all available at the hip using the gluteus, and hip flexor muscles.

**Shoulder** Ball and Socket joint – Flexion, extension, rotation circumduction, abduction and adduction are all available at the hip using the deltoid muscles.



## B- Know About The Musculoskeletal System And Cardiorespiratory System And The Effects On The Body During Fitness Training



### Short-term effects of fitness training on the cardiorespiratory system:

#### 1. increased heart rate and breathing rate during fitness training activities

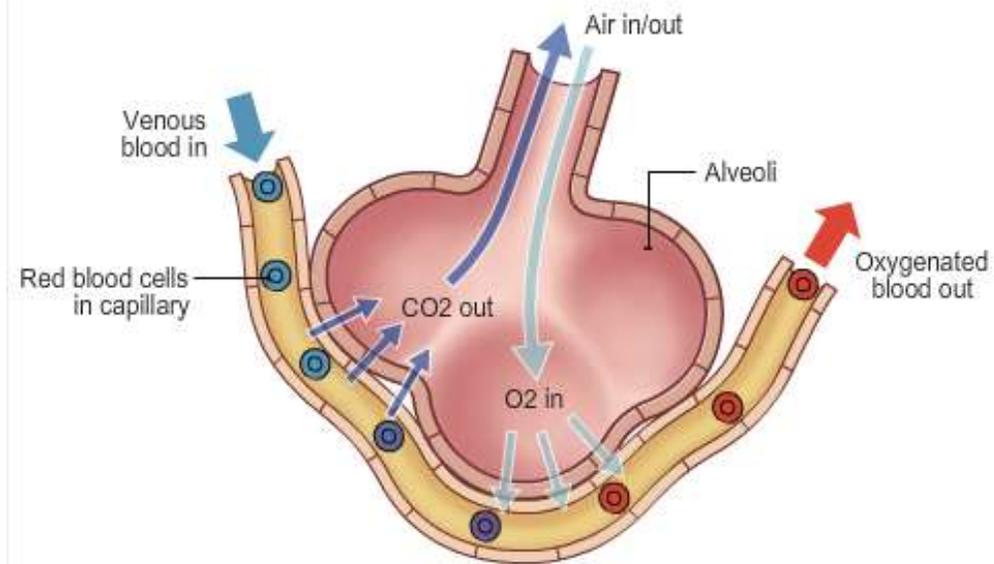
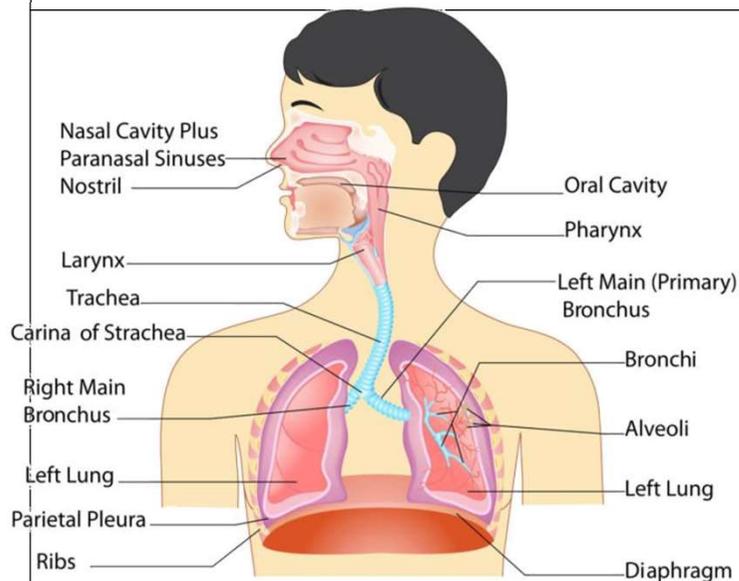
to supply oxygen to working muscles

As you start exercise there is an increase in demand for energy. This energy can be supplied through aerobic (with oxygen) or anaerobic (without oxygen) respiration. As there is an increase in demand for energy this must be supplied through blood which is why we see an increase in heart rate and more blood is being delivered to active muscles.

Following exercise the cardio respiratory system will slowly return to its resting values.

#### 2. Increased build-up of lactic acid as a result of increased intensity in the main component.

As a by product of exercise lactate or 'lactic acid' is produced which leads to fatigue. This is due to the increased acidity in the cells as a result of the reactions taking place to release the required energy. During recovery when oxygen is available lactate can be broken down and removed from the body and some can be converted back into energy for physical work.



## Child Development

### Gross motor development:

- Newborns are born with reflexes – sucking, rooting, startling, grasping – which help them survive. Movements are uncontrolled and uncoordinated:
- at three months able to lift up head and chest when on their stomachs and bring hands together over body
- at six months can roll over from back to front
- at nine months can sit unsupported and is usually mobile by crawling or rolling, may pull up to stand alone and walk by holding on to furniture
- at twelve months pulls up to stand, stands alone, walks holding on to furniture.

### Fine motor development:

- No coordinated movement but newborns will grasp things put into their hands as a reflex action
- at three months can watch their hands and hold a rattle for a moment
- at six months can reach for a toy and move a toy from one hand to the other
- at nine months can use a pincer grasp (index finger and thumb) to grasp objects, can deliberately release objects by dropping them
- at twelve months can use pincer grasp to pick up small objects, points using index finger.



### Cognitive development:

- at one month 'freezes' if hears a sound played softly
- at three months can recognise familiar routines, alert and follows movement with eyes if objects are close
- at six months can explore objects by putting in mouth, recognises voices
- at eight or nine months can look for dropped objects and objects that they see being hidden
- at twelve months enjoys throwing toys to the ground and watching their descent, learns by trying things out and repeating if successful. This approach to learning is called 'trial and error'

### Emotional and social development:

- at one month can focus on human faces with interest
- at six weeks can smile
- at three months enjoys being held and forms indiscriminate attachments
- at six months can recognise and respond to emotions in others
- from seven to eight months can form specific attachments and show wariness of strangers
- from eight months develops specific attachments and imitates actions of others, such as clapping
- from eight months experiences separation anxiety from primary carer(s).

### Communication and language development:

- at one month can turn head to adult voice, at six weeks begins to coo
- at three months smiles when hears a familiar voice
- at six months makes short babbling sounds, such as 'da' and 'ba'
- at nine months understands 'no', vocalises in long strings of babbling
- at twelve months knows own name and understands simple instructions

**Development: Birth – 12 months**

## Child Development

### Gross motor development:

- at fifteen months can crawl upstairs and may walk hesitantly
- at eighteen months can walk unaided, can walk upstairs with help and can squat to pick up toys
- at two years can run, climb onto furniture and use sit-and-ride toys
- at two and a half years can kick a large ball and can jump with two feet together from a low step
- at three years able to run forwards and backwards, steer and pedal a tricycle, walk upstairs with alternate feet and throw a large ball.

### Fine motor development:

- at fifteen months pincer grasp is precise, uses palmar grasp to hold crayons
- at eighteen months can build a tower of three bricks, can feed self with a spoon and scribble using a crayon in palmar grasp
- at two years can draw dots and circles, can put on shoes and fasten with Velcro® but not buckles and laces
- at two and a half years starts to show a hand preference, can pull down items of clothing and starting to develop tripod grasp
- at three years can use tripod grasp, draw a circle, hand preference is established for most tasks.



## Development: 12 month – 3 years

### Cognitive development:

- at fifteen months explores objects by sight and sound
- at eighteen months very curious to explore environment, remembers where things belong
- at two years recognises self in mirror, can remember past experiences
- at two and a half years recognises self in photographs, with help can complete simple puzzles
- at three years understands the difference between past and present, can complete simple puzzles

### Communication and language development:

- at fifteen months communicates by pointing and vocalising, has up to six words
- at eighteen months has around 15 words, able to communicate wishes, understands simple requests
- at two years has up to 50 words, able to join words, enjoys looking at books
- at two and a half years has around 200 words, starting to use simple sentences, asks questions, uses personal pronouns, plurals and negatives
- at three years speech is clear to anyone unfamiliar with child, enjoys books and turns pages.

### Emotional and social development:

- at eighteen months emotionally dependent on parents and key persons, plays alone but enjoys being near adults and siblings, insistent on immediate attention to needs and can copy adult actions
- at two years unable to wait for needs to be met, may be distracted from tantrums, plays in parallel with other children but unable to share toys
- at two and a half years plays alongside other children and engages in onlooker play, very dependent on adults and jealous of other children gaining attention, responds well to adult attention and praise and has tantrums when frustrated
- at three years finds it easier to wait, starting to take turns and share, enjoys being with other children and will comfort another child.

## Child Development

### Gross motor development:

- from three to four years can hop on one foot, walk along a line, aim and throw a ball and kick it with force, ride a tricycle using pedals
- from four to five years can run avoiding obstacles, skip with a rope, throw a large ball to partner and catch it.

### Fine motor development:

- from three to four years can button and unbutton clothes, use scissors to cut out simple shapes, draw a person with head, trunk and legs, eat with a knife and fork, thread beads to make a necklace
- from four to five years can form letters, write own name and colour in pictures.

### Cognitive development:

- from three to four years can recognise and name primary colours, understands what is meant by 'more', can tell whether an object is heavy or light, arranges objects into categories, makes a connection between people and events
- from four to five years can count accurately up to 10, can add two sets of objects together, can match equal sets, understands the need for rules, names the time of day associated with activities.

### Communication and language development:

- from three to four years, speech can be easily understood, although some words may be incorrect, uses questions and by four years language is fluent, with some speech immaturities
- from four to five years can count accurately up to 10, uses complex sentences with words such as 'because', can talk about what has happened and what might happen, uses language to argue and answer back.

### Emotional and social development:

- from three to four years can cope with separation from primary carer with someone they know, is beginning to play cooperatively and show clear friendship preferences, and plays with others
- from four to five years can work out what other people may be thinking, which helps them to negotiate with others, able to understand the need for rules, develops close friendships develop, behaviour mostly cooperative and separates more easily from parents.

## Development: 3 – 5 years



## Child Development

### Gross motor development:

- from five to eight years can hop, skip and jump confidently, can swerve and dodge when running, balance on a beam, ride a bicycle and use roller skates
- coordination is more proficient, allowing for tasks that require coordinated movements including improved ball skills, swimming activities, hopscotch.

### Fine motor development:

- from five to eight years can tie and untie shoelaces, and accurately cut out shapes
- from six years able to thread a large-eyed needle and sew large stitches, has good control over pencils and paintbrushes, allowing for more detailed drawings and clear handwriting.

### Cognitive development:

- from five to eight years can recognise numerals up to 100, do simple calculations, show simple reasoning and be reasoned with
- from seven years can 'conserve' quantities and numbers, complete a simple maze, is starting to tell the time, understands the need for and uses rules.

### Communication and language development:

- from five to eight years uses language to reason and explain ideas, understands and enjoys jokes and riddles
- uses more complex sentence structures and asks what, when, who, where, how, why questions
- from seven years has mastered the basics of reading and writing.

### Emotional and social development:

- from five to six years starts to compare self with others and becomes more aware of the feelings and needs of others
- confidence in self may be shaken by 'failure'
- from five to seven years has strong friendships, often of the same gender, can understand that others have different viewpoints than them, can read facial expressions of others accurately and recognise what others might be feeling.

## Development: 5 years – 8 years



## Unit 2: UK Travel and Tourism Destinations

What you need to know – tourist destinations	Explanation/Answers
Capital Cities of the UK	The capital of the UK is London The capital of England is London, the capital of Northern Ireland is Belfast, of Scotland is Glasgow and of Wales is Cardiff
The location of a variety of seaside resorts in the UK	For example, Skegness, Great Yarmouth, Margate, Brighton, Newquay, Weston-Super-Mare, Barry Island, Bangor (Wales), Bangor (N. Ireland), Southport, Blackpool, Portishead, South Shields, Whitby
The location of major countryside areas in the UK	For example National Parks such as the Peak District, Snowdonia, Cairngorms, Exmoor, Brecon Beacons, Snowdonia, Lake District, and Areas of Outstanding Natural Beauty such as the Cotswolds, Causeway Coast, Isles of Scilly
The location of the UK's major cultural destinations (and why they are culturally significant)	For example Stratford-upon-Avon (Shakespeare), Warwick (Castle), London (Arts and Performance), Edinburgh (Festival of Arts and Entertainment), Nottinghamshire (Robin Hood)

What you need to know – UK entry points	Explanation/Answers
Major airports in the UK, their location and three-letter code	London Heathrow (LHR), London Gatwick (LGW), London Stansted (STN), London Luton (LTN), Bristol (BRS), Birmingham (BHX), East Midlands (EMA), Manchester (MAN), Leeds Bradford (LBA), Newcastle (NCL), Edinburgh (EDI), Glasgow (GLA), Belfast International (BFS)
Major UK passenger sea ports and their routes to Ireland or Continental Europe	Fishguard to Rosslare, Holyhead to Dublin, Newcastle to Amsterdam, Hull to Rotterdam, Harwich to Hook of Holland, Dover to Oostend, Dover to Calais, Newhaven to Dieppe, Portsmouth to Caen, Plymouth to Santander

What you need to know – UK travel routes	Explanation/Answers
Major motorways in the UK, including the cities they serve	M1 – London, Milton Keynes, Derby/Nottingham, Sheffield, Leeds M4 – London, Reading, Bristol, Cardiff M25 – London orbital M3 – London, Basingstoke, Southampton M20 – London, Maidstone, Dover
Major rail lines in the UK, including the cities they serve	Midland Mainline – London, Leicester, Derby, Sheffield West Coast Main Line – London, Birmingham, Crewe, Carlisle, Glasgow East Coast Main Line – London, Peterborough, York, Newcastle, Edinburgh, Inverness Great Western – London, Reading, Bristol, Newport, Cardiff, Swansea Great Eastern – London, Diss, Norwich



## Unit 2: UK Travel and Tourism Destinations

Why do people visit the UK? What facilities do they use?	Explanation/Answers
Visitor attractions	National trust and English Heritage Properties, theme parks, museums, historical sites, heritage sites and wildlife parks
Natural features	Mountains, beaches, lakes, rivers and coasts
Accommodation	Hotels, guest houses, bed and breakfast, self catering, camping, caravanning, holiday parks, boats
Facilities	Sport and Leisure facilities, shopping, restaurants
Arts and entertainment	Theatres, exhibitions, art galleries, exhibitions, local festivals/events
Sightseeing	Guided tours, ghost walks, boat trips, road trains
Transport links	Road, rail, air, sea links

What are visitors to the UK like?	Explanation/Answers
Visitor types	Groups, families, age of visitor, culture, level of understanding of English, individual needs
Where they come from	Inbound (arriving the UK from overseas), Domestic (UK residents)

### How can destinations increase their appeal?

You need to understand how and why a destination or facility can appeal to a greater range of tourists. What might they do?

- Improve facilities
- Appeal to a specific customer type
- Offer better transport links
- Adjust costs/admission
- Offer add-ons
- Appeal to a wider range of visitors
- Appeal to a different age group
- Improve interactivity
- Become part of a 'bundle' of attractions – one price for multiple sites

You will need to suggest what techniques different tourist facilities or destinations can use, and be able to justify these fully.





## Unit 2: UK Travel and Tourism Destinations

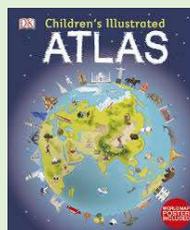
Other than by using the internet, how else can visitors find information about facilities, attractions and holidays in the UK?



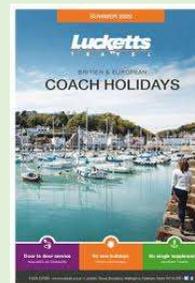
Guidebooks



Tourist Leaflets



Atlases



Holiday Brochures



Tourist Information Centres

How do you plan a holiday for somebody?	Explanation/Answers
Visitor requirements	A summary of what the visitors would like
Preferred dates/times	It is important to understand exactly when the person wishes to travel. What date? What time on that date? Sometimes, if a visitor is flexible, they can save money
Travel requirements	Are they travelling independently (e.g. by road, rail, air etc.) or as part of an organised tour (coach tour, cruise etc.)
Accommodation requirements	What standard of accommodation (e.g. star rating), type of accommodation (e.g. stately home, hotel, apartment, holiday park, campsite etc.). On what board basis?
What is their motivation for travel?	Are they travelling to relax? To undertake activities? For a special occasion?
What do they want to see?	Are they looking to visit natural features? Cultural features?
What is their budget?	How much are they aiming/willing to spend?



## GCSE Statistics – Key Definitions

## 2 Processing and representing data

**Recording data**

- A **database** is a collection of information.
- A **two-way table** shows information in two categories.
- **Tables** give exact data values for different categories, but do not show trends and patterns as clearly.
- **Bivariate data** has two variables.

**Pictograms, bar charts and vertical line graphs**

- A **pictogram** uses symbols or pictures to represent a number of items.
- In a **bar chart**, bars are **equal width** with equal spaces between them. The height (or length) of the bar represents the **frequency**.
- A **vertical line graph** is similar to a bar chart, but uses lines instead of bars.
- **Multiple bar charts** have more than one bar for each class. A **key** shows what each bar represents. The frequencies of each category can easily be compared.
- A **composite bar chart** compares data for each category in a single bar, divided into components that show the frequency for each part. A key identifies each component.
  - The **total frequencies** and the frequencies of each component group can be compared.
- **Bar charts** and **vertical line graphs** show trends and patterns in data.

**Stem and leaf diagrams**

- A **stem and leaf diagram** shows numerical data split into a 'stem' and 'leaves'. The numbers are written in order. A key shows how to combine the stem and leaves to read the numbers.
- A stem and leaf diagram shows the shape of the data distribution in the same way as a bar chart, but retains the original data values.
- A **back-to-back stem and leaf diagram** shows two sets of data with the same stem. The smallest values on each row are always nearest the stem.

**Pie charts**

- A **pie chart** is a way of displaying data when you want to show how something is shared or divided. Pie charts show proportions but not accurate data values.
- The **area of each sector** of a pie chart is proportional to the frequency it represents. The **area of the whole pie chart** is proportional to the total frequency.
- **Comparative pie charts** are used to compare two sets of data with different total frequencies.
  - The areas of the two circles should be **in the same ratio** as the two total frequencies.
  - To compare the **total frequencies**, compare the **areas**. To compare **proportions**, compare the individual **angles**.

**Population pyramids**

- **Population pyramids** are similar to stem and leaf diagrams. They show the age groups in a population, usually divided by gender.

**Choropleth map**

- A **choropleth map** is used to classify regions of a geographical area. Regions are shaded with an increasing depth of colour. A key shows what each shade represents.
- A choropleth map can be a diagram rather than an accurate map.

**Histogram**

- A **histogram** is similar to a bar chart but, because the data is continuous, there are no gaps between the bars.
- To draw a **histogram for unequal class intervals**, adjust the height of the bars so the **area** of the bar represents the frequency. The height of each bar represents the **frequency density**.
- $$\text{Frequency density} = \frac{\text{frequency}}{\text{class width}}$$
- You can compare data from histograms if they have the same class intervals and the same frequency density scales.

**Frequency polygons**

- A **frequency polygon** joins the midpoints of the tops of the bars of a histogram with straight lines. A frequency polygon may be drawn with or without a histogram.

**Cumulative frequency**

- **Cumulative frequency** is the running total of the frequencies from each class interval.
- For discrete data, you can draw a **cumulative frequency step polygon**. Plot the cumulative frequencies against the upper class boundaries. Join the steps with straight lines.
- For grouped continuous data, you can draw a **cumulative frequency diagram**. Plot the cumulative frequencies against the upper class boundaries. Join the points with a smooth curve or straight lines.
- Cumulative frequency diagrams can be used to estimate or predict other values.

**Distributions**

- The **shape of a distribution** is the shape formed by the bars in a histogram, or by a frequency polygon, or by the rows of a stem and leaf diagram.
- A **distribution** can be **symmetrical**, or have **positive skew** or **negative skew**.

**Misleading diagrams**

- **Three-dimensional diagrams** make comparisons difficult as data proportions appear distorted.
- Diagrams without clear scales, labels or keys may be misleading.

# GCSE Statistics – Key Definitions

## 3 Summarising data

### Averages

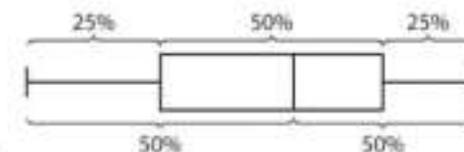
- When the number of data values,  $n$ , is odd the **median** is the value of the  $\frac{1}{2}(n + 1)$ th observation. When  $n$  is even, the median is the mean of the two middle values.
- Mean** =  $\bar{x} = \frac{\sum x}{n}$ 
  - $\bar{x}$  is the mean of all the  $x$  values.
  - $\sum x$  is the sum of all the  $x$  values.
- The **mode** is the data item with the highest frequency.
- The data in a frequency table is written in order. The median is the  $\frac{1}{2}(n + 1)$ th value.
- The **modal class** is the class with the highest frequency.
- For grouped continuous data, or for large data sets, the median is the  $\frac{1}{2}n$ th value.
- For grouped data, estimated median =  $L + \frac{\frac{n}{2} - F}{f} \times w$  where:
  - $L$  is the lower boundary of the class containing the median
  - $n$  is the total number of values
  - $F$  is the cumulative frequency of the intervals before the one containing the median
  - $f$  is the frequency of the median class interval
  - $w$  is the width of the median class interval.
- When all the data values are increased (or decreased) by the same amount or percentage, the averages are increased (or decreased) by the same amount or percentage.

- Summary statistics summarise the data. The mean, median, mode, standard deviation, range and interquartile range are all summary statistics.
- A **box plot** represents the maximum and minimum values, the median and the upper and lower quartiles for a set of data.
- Range** = largest value – smallest value.
- Interquartile range (IQR) = upper quartile – lower quartile.
- H** An **outlier** is any value that is more than 1.5 times the interquartile range below the lower quartile or more than 1.5 times the interquartile range above the upper quartile.
  - Small outlier is less than  $LQ - 1.5 \times IQR$
  - Large outlier is greater than  $UQ + 1.5 \times IQR$
- Another definition of an outlier is a value more than 3 standard deviations from the mean.

### Distributions

- A **distribution** can be **symmetrical**, or have **positive skew** or **negative skew**.
- For a set of data:
  - mean > median > mode could indicate positive skew
  - mode > median > mean could indicate negative skew.

- H** Skew =  $\frac{3(\text{mean} - \text{median})}{\text{standard deviation}}$
- If a sample is representative of a population, you can use the mean, median, range and IQR of the sample to estimate these statistics for the population.
- In a distribution:
  - 50% of the data in a distribution is less than the median, and 50% is greater than the median.
  - 25% of the data is less than the lower quartile
  - 25% of the data is greater than the upper quartile
  - 50% of the data is between the lower and upper quartiles.



**H** Weighted mean =  $\frac{\sum(\text{value} \times \text{weight})}{\sum \text{weights}}$

### Measures of dispersion

- An **interpercentile range** is the difference between two percentiles. An **interdecile range** is the difference between two deciles.
- The standard deviation is a measure of how much all the values deviate from the mean value, or how spread out they are.
- Standard deviation** =  $\sqrt{\frac{1}{n} \sum (x - \bar{x})^2}$  or  $\sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$
- The two formulae to calculate the **standard deviation for a frequency table or grouped data** are:
  - standard deviation =  $\sqrt{\frac{\sum f(x - \bar{x})^2}{\sum f}}$  or  $\sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$



30 %

Coursework

Screenplay



- 800 and 1000 words
- It must be in size 12 font
- It must have one inch margins
- It must be courier font

Storyboard and Shooting Script



- You must choose a key section of your script to make the shooting script for.
- It must be 1 minute long- one full A4 page

Evaluation



- An evaluative analysis of 750-850 words
- Comparison to like minded films.

<u>Propp</u>	<u>Todorov</u>	<u>Levi Strauss</u>	<u>Barthes</u>
<ul style="list-style-type: none"> <li>• Vladimir Propp</li> <li>• 1920s</li> <li>• Character Types</li> </ul>	<ul style="list-style-type: none"> <li>• Tzvetan Todorov</li> <li>• 3 Stages of equilibrium</li> </ul>	<p>Binary Oppositions</p>	<ul style="list-style-type: none"> <li>• Roland Barthes</li> <li>• 5 Narrative Codes</li> <li>• Action</li> <li>• Enigma</li> </ul>

Key Terminology

1. Aesthetics
2. Narrative
3. Screenplay
4. Evaluation
5. Enigma
6. Segregation Subjugation
7. Equilibrium
8. Xenophobia
9. Dystopian
10. Dehumanise
11. Binary

Component 2 Exam- what you are tested on

1. Narrative (structural element of film form): global English language film. (District 9) See above Narrative theorists.
2. Representation of people and ideas: global non-English language film. (Tstoti)
3. Film style – the aesthetic qualities of film: contemporary UK film. (Skyfall).



### Key Information

- **Director:** Sam Mendes 2012
- **Cinematographer:** Roger Deakins
- **Based on:** James Bond by Ian Fleming

### To get the higher end of Q4

- Describe what you think about the look of the film.
- Consider the selection of shots/ angles and how they are emphasised through framing and lighting.
- Refer to the ways cinematography and lighting work together with mise-en-scene.

### Key Scene

#### *The Train Scene*

#### Other Key Scenes

*Glass skyscraper in Shanghai*

*The Introduction of Severine.*

*The Fall of Skyfall Manor*

### Example opening for Q4 15 marks.

The opening shot of the film is composed to mimic the gun barrel logo that appears at the start of James Bond films. Bond's steps into a hallway, backlit by warm, golden light. Moving further down the hallway, his piercing eyes highlighted by a shaft of warm light. This combination of shadow and warm light helps to establish Bond as the film's protagonist while the composition of the shot mimics the traditional opening of a James Bond film.

The dramatic music continues to increase in intensity as Eve emerges from the ruined car with a rifle, crouching to take a shot. Mendes cuts to a point of view shot through the rifle's sights. There are a series of close ups as he cuts back and forth between the sights, the look of concentration on her face and Bond. "I may have a shot," Eve says. There is a mid shot of M, the camera dolly in the speakerphone. Mendes cuts rapidly between mid shot of Bond, the sights and a close up of Eve. "It's not clean," she says. The music continues to rise in intensity and the pace of editing becomes faster until M finally says, "Take the bloody shot." There is a sharp crack as the rifle discharges and Bond falls from the roof of the train. Throughout much of this scene, Mendes uses loud non-diegetic music and fast paced editing to create a sense of action and excitement. When Bond is hit by the bullet, the music stops and there is silence, save for the ragged sound of Eve breathing and the desolate sound of wind. To draw out the suspense over Bond's fate, Mendes cuts to a shot of M and then Bill Tanner (Rory Kinnear) as they wait for a response. Finally, he cuts to a shot of the speakerphone, the silence continuing for a moment before Eve says, "Agent down."

### The Exam- Component 2 C

- Q1: A 1 mark question on cinematography. Use appropriate terminology. (1)
- Q2: What response does the type of cinematography you gave in Q1 try to get from the audience? (4)
- Q3: Begin to identify your 1 sequence. Make sure that you give a number of points for the one sequence. (5)
- Q4: Focus on the same sequence as in Q3. At least 3 different points about the type of cinematography you are exploring. (15)

# District 9

## About:

Country: **South Africa**

Production Year: **2009**

Director: **Neill Blomkamp**

Certificate: **15**

Release Date: **4 September 2009**

## Synopsis:

District 9 is a science – fiction thriller based on Neill Blomkamp's 2005 short film, 'Alive in Jo'burg', which sees aliens stranded in Johannesburg only to be exiled to slums. Blomkamp directed the 2009 film that follows one man as he becomes trapped in the alien territory.



## What is a Pseudo-documentary?

Having the appearance of but is not actually a real documentary.

## What is Gaze of the medium?

Seeing the world through the eyes of the camera.

Within this unit of work, we will be looking at the **narrative structure** and the way that narrative is crafted in order to appeal to the audience.

**Circular**

**Begins at the end.**

**Linear**

**Normal order of events.**

**Episodic**

**Broken story in chapters.**

# PUNCTUATION

## Full Stop

Use full stops at the end of a sentence or abbreviation.

## Question Mark

Use question marks at the end of a question instead of a full stop.

Use quotation marks for direct quotations or to show spoken words.

“ ”

Quotation Marks

## Apostrophe

Use apostrophes in contractions and to show possession.

## Comma

Use commas to separate clauses in complex sentences and separate items in a list or before a speech mark.

## Ellipsis

An ellipsis can be used to show words that have been missed out of a quotation or informally to show an incomplete sentence.

## Exclamation Point

Use exclamation points at the end of an exclamation.

## Colon

A colon can be used to introduce a list and before a final clause that explains something in the sentence.

## Parentheses

Use parenthesis around an inserted comment, aside, explanation or additional information.

## Semicolon

Use a semicolon to join two independent clauses that are not connected with a conjunction.



# Paragraphs

Remember **PPPTT**

Start a new paragraph for these reasons:

**P**

**erson**

If a new person is talking or a new character being described.

**P**

**lace**

If the story or text has changed location.

**P**

**oint**

If you start to make a new point.

**T**

**opic**

If you've started writing about something different.

**T**

**ime**

If a significant change in time has happened and it has been mentioned.

# Literacy Writing Mat

## Sentence Openers

### Realities

'Once upon a time...'

'To begin with...'

'I sleepily opened my eyes...'

'I will never forget the time...'

### Expository Writing

'My name is \_\_\_\_\_ and I am writing to argue for...'

'Let me get things straight...'

'First of all...'

'One thing that you need to know about ... is...'

### Indication/Exclamation

'It has been reported that...'

'Witnesses were shocked last night as...'

'Recent research has shown...'

### Introducing

'Firstly... 'To begin with...'

### Analyzing

'I am writing to analyse the...'

'The text that I have been reading is...'

### Summarizing

'The good points about ... are'

## Vocabulary

### Adjectives

- Instead of **Big** - **Huge, Enormous, or Gigantic.**

- Instead of **Small** - **Tiny, Minute, or Miniature.**

- Instead of **Old** - **Ancient, Outdated, or Antiquated.**

- Instead of **Young** - **Youthful, Infantile, immature.**

- Instead of **Good** - **Fantastic, Excellent, Outstanding.**

### Adverbs

Use these to add more detail to verbs and adjectives.

'Speedily' 'Thoughtfully'

'Casually' 'Purposefully' 'Slowly'

'Innocently' 'Consequently'

'Incredibly' 'Overwhelmingly'

'Nicely' 'Superbly' 'Flatly'

'Questionably' 'Massively'

'Darkly' 'Nicely' 'Subtly'

'Massively' 'Happily'

## Adding Connectives

'And' 'Also' 'As well as'

'Too' 'Additionally' 'Especially'

'Moreover' 'Furthermore'

'Notably' 'Above All' 'Indeed'

'Significantly' 'In addition to'

## Contrasting Connectives

'However' 'Whereas' 'But'

'Yet' 'Nevertheless' 'Still'

'Conversely' 'On the other hand'

'Then again' 'In spite of this'

'Though' 'Then' 'Except'

'But' 'Apart from' 'Aside from'

## Time Connectives

'Firstly' 'Finally' 'In the end'

'Secondly' 'Primarily' 'After'

'Thirdly' 'Before' 'Meanwhile'

'When' 'Consequently' 'Now'

'Later' 'Since' 'Suddenly'

'After a while' 'Following'

## Punctuation

• ( )

; - ?

! { }

/ , :

' ' \

## Using Speech Marks

'Speech marks should go around every word that was said,' instructed my English teacher.

Speech marks go outside the other punctuation in the sentence.

## Using Apostrophes

Use apostrophes only to:

- Show when something belongs to someone, e.g. *'It was Sarah's book.'*

- Show when letters have been left out, e.g. *'Football - can't - ar - ib - net - dant.'*

## Common Mistakes

### Their, There's, and There

Their - When something belongs to someone, e.g. *'It was their dog.'*

They're - When you are replacing the word 'they are.' e.g. *'I like dogs. They're funny.'*

There - All other situations, e.g. *'The dog was over there.'*

### Should, Could, Would

This mistake happens because people hear the term 'could've' and think that 'could of' is being said. What is actually meant is 'could have.'

Wrong: *'I could of gone today.'*

Correct: *'I could have gone today.'*

The same applies to 'should' and 'would.'

### Two, Two, To

Two - 200 number two, e.g.

*'There were two days until Christmas.'*

Too - 'Also' or 'As Well', e.g. *'I am excited for Christmas too.'*

To - All other situations, e.g. *'I went into town to buy a Christmas tree today. To see the lights was so lovely.'*

# TYPES OF SENTENCES.

## SIMPLE SENTENCE

Subject + **verb** = simple sentence.

My **brother** **walked** into the field.

## COMPOUND SENTENCE

Sentence **CONJUNCTION** sentence.

These are called conjunctions

but  
so  
and  
if  
when  
although  
whereas

My **brother** **walked** into the field and he **found** his football.

## COMPLEX SENTENCE

Opener, sentence.

Adverbs, connectives and verbs can be used as openers.

slowly  
quietly  
carefully  
smiling  
finally  
in addition  
hoping  
screaming

This is an independent clause

Carefully **pushing** the gate open, my **brother** **walked** into the field.

**Smiling** to himself, my **brother** **walked** into the field.

(When you are confident with this structure, try moving your subordinate clause to the end of the sentence or embedding it into the middle of the independent clause.)

SENTENCES

SENTENCES

SENTENCES



## Vocabulary Instruction The Power of Words



### Break it down:

How many syllables?

What does it sound like?

### Definition:

### Say it in a sentence:

Now write the sentence.



### Synonyms:

Words with similar meanings

### Antonyms:

This word is opposite to...

### Can you draw it?

