

ENGLISH

English Literature: An Inspector Calls (Sets 1-2)

"If you believe you can achieve!"

Key Quotations

1. 'I'm talking as a hard-headed, practical man of business. And I say there isn't a chance of war.' (Mr. B)
2. 'A chain of events.' (Inspector)
3. But these girls aren't cheap labour – they're *people*.' (Sheila)
4. 'Girls of that class-' (Mrs B)
5. - 'You mustn't try to build up a kind of wall between us and that girl.' (Sheila)
6. 'You were the wonderful Fairy Prince. You must have adored it, Gerald.' (Sheila)
7. 'Go and look for the father of the child. It's his responsibility.' (Mrs B)
8. 'Each of you helped to kill her.' (Inspector)
9. 'There are millions and millions and millions of Eva Smiths and John Smiths...' (Inspector)
10. - 'We are members of one body. We are responsible for each other.' (Inspector)
11. - 'They will be taught it in fire and blood and anguish.' (Inspector)
12. 'The famous younger generation who know it all. And they can't even take a joke-' (Mr. B)



Social And Historical Context

Learn the following mnemonic SMACDOWN to help you remember the key contextual information for An Inspector Calls:

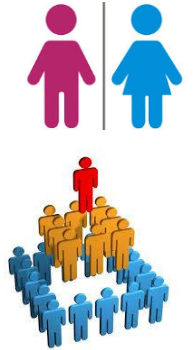
- Socialism
- Microcosm
- Age
- Capitalism
- Darwinism
- Order in Society
- Women
- Nepotism



Themes

You may be asked to write an essay on a them in Blood Brothers. Make sure you know the relevance of each theme in the play:

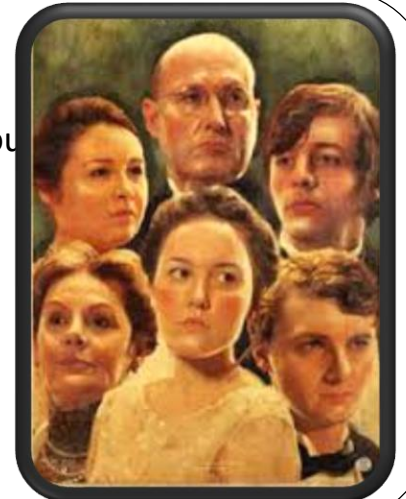
- Gender
- Social Status
- Social Responsibility
- Family
- Generational Differences
- Time
- Supernatural
- Guilt & Remorse



Characters

Ensure you know the importance of each character. You could test yourself by checking you know quotations for each character. Make sure you know which themes the characters link to.

- Mr Arthur Birling
- Mrs Sybil Birling
- Miss Sheila Birling
- Mr Eric Birling
- Mr Gerald Croft
- Eva Smith/Daisy Renton



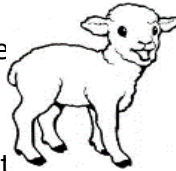
Act 1 Key Quotations

1. Mrs Johnstone: I said, I said look, next week I'll pay y'
2. Mrs Johnstone: I love the bones of them.
3. Mrs Lyons: Give one to me.
4. Edward: Don't you know what a dictionary is?
5. Mrs Lyons: You see why I don't want you mixing with boys like that! You learn filth from them.



Act 2 Key Quotations

1. Narrator: Who'd dare tell the lambs in spring what fate the later seasons bring?
2. Mickey: I'd crawl back to that job for half the pay and double the hours.
3. Edward: Why...why is a job so important? ...I've got money, plenty of it.
4. Linda: An' what about what I need? I need you.
5. Mickey: I could have been...I could have been him.



Social And Historical Context

Learn the following mnemonic MEMES to help you remember the key contextual information for Blood Brothers.

- **M**arilyn Monroe
- **E**mployment
- **M**argaret Thatcher
- **E**ducation
- **S**ocial class



Themes

You may be asked to write an essay on a them in Blood Brothers. Make sure you know the relevance of each theme in the play:

- Gender
- Social Class
- Social Inequality
- Violence
- Superstition
- Motherhood/Family
- Loyalty



Characters

Ensure you know the importance of each character. You could test yourself by checking you know quotations for each character. Make sure you know which themes the characters link to.

- Mrs Johnstone
- Mrs Lyons (Jennifer)
- Mickey Johnstone
- Edward/Eddie Lyons
- Linda
- The Narrator
- Mr Lyons (Richard)
- Sammy
- Milkman/Gynaecologist/Catalogue Man



English Literature: Macbeth- Plot & Themes

"If you believe you can achieve!"

10 Key Quotations Linked to Themes. This is the absolute minimum you should know:

Fate V Free Will

M: Art thou but a dagger of the mind?
W: None of woman born shall harm Macbeth.



Gender

LM: Yet I fear thou art too full of the milk o' human kindness.
LM: I would have dash'd the brains out.



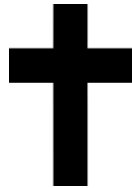
Power and Ambition

M: Stars, hide your fires. Let not light see my black and deep desires.
LM: Look like the innocent flower but be the serpent under't.



God and Religion

GM: She has a light by her continually.
M: I could not say Amen when they did say God bless us.



Supernatural

LM: Come you spirits that tend on mortal thoughts unsex me here.
W: Fair is foul and foul is fair.



You will need to know the plot of the play. Here is a basic summary of each act:

Act 1

- The witches deliver their prophecies to Macbeth and Banquo.
- Macbeth writes to Lady Macbeth explaining what has happened.
- Lady Macbeth persuades Macbeth to Kill King Duncan.

Act 2

- Lady Macbeth covers up the murder.
- Malcolm and Donaldbain flee from Scotland.
- Macbeth becomes King of Scotland.



Act 3

- Macbeth hires murderers to kill Banquo and his son, Fleance, but Fleance escapes.
- Macbeth sees Banquo's ghost at the banquet

Act 4

- Macbeth visits the witches and is shown three apparitions which give him warnings
- Macbeth has Macduff's family murdered



Act 5

- Lady Macbeth sleepwalks and imagines blood on her hands
- The English army advance disguised as Birnam Wood
- Lady Macbeth kills herself
- Macduff kills Macbeth
- Malcolm becomes King of Scotland

English Literature: Macbeth- Analysis

"If you believe you can achieve!"

Key Context Points for Macbeth

- King James of Scotland- the play was written for a Jacobean audience
- King James I was the author of book on witchcraft
- King James I succeeded Elizabeth I
- The Gunpowder Plot— Catholics tried to assassinate James, a Protestant King
- The Divine Right of Kings— society believed the King was God's chosen representative on Earth
- This links to the Great Chain of Being- it was a sin to disrupt this 'chain'
- Women were expected to be passive, maternal, religious, dominated, submissive
- The play was adapted from real life Macbeth and James I was descended from Banquo
- Jacobean society was extremely religious—they had strong beliefs about Heaven and Hell, the afterlife, witches
- 3 key areas of context which link to James I's fears can be recalled using the mnemonic WWE:
 - ✓ Women
 - ✓ Witches
 - ✓ End of his life



Key Symbols and Motifs

- Sleep/conscience
- Blood/guilt
- Good v evil
- Succession
- Light and dark
- Water/innocence
- Disruption of natural order/chaos



The Literature Examination requires you to fulfil certain criteria. This bullet point list is a starting point and indicates the minimum of what should be included in every paragraph of your examination answer:

- Method
- Quotation
- Explain
- Words- analyse
- Effect/impression on reader/audience
- Writer's purpose linked to context



Ozymandias

Poet: Percy Shelley
Born: 1792

3 key quotations to learn:

- 'shattered visage'
- 'Look on my works, ye Mighty, and despair!'
- 'The lone and level sands stretch far away.'



London

Poet: William Blake
Born: 1757

3 key quotations to learn:

- 'Marks of weakness, marks of woe'
- 'The mind-forged manacles I hear'
- 'the chimney-sweeper's cry every black'ning church appalls'



Prelude

Poet: William Wordsworth
Born: 1770

3 key quotations to learn:

- 'my boat went heaving through the water like a swan'
- 'a huge peak, black and huge'
- 'through the meadows homeward went, in grave and serious mood'

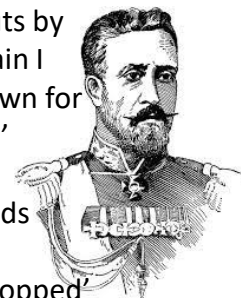


My Last Duchess

Poet: Robert Browning
Born: 1812

3 key quotations to learn:

- 'none puts by the curtain I have drawn for you but I'
- 'I gave commands then all smiles stopped'
- 'Taming a sea-horse'



War Photographer

Poet: Carol Ann Duffy
Born: 1955

3 key quotations to learn:

- 'spools of suffering set out in ordered rows'
- 'how the blood stained into foreign dust'
- 'The reader's eyeballs prick with tears between the bath and pre-lunch beers'



Poppies

Poet: Jane Weir
Born: 1963

3 key quotations to learn:

- 'all my words, flattened, rolled, turned into felt, slowly melting'
- 'A split second and you were away, intoxicated'
- 'hoping to hear your playground voice catching on the wind.'

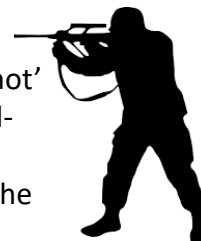


Remains

Poet: Simon Armitage
Born: 1963

3 key quotations to learn:

- 'probably armed, possibly not'
- 'his blood-shadow stays on the street'
- 'the drink and drugs won't flush him out'



Kamikaze

Poet: Beatrice Garland
Born: 1938

3 key quotations to learn:

- 'a one way journey into history'
- 'little fishing boats strung out like bunting'
- 'he must have wondered which had been the better way to die'



The Charge of Light Brigade

Poet: Alfred Lord Tennyson
Born: 1809

3 key quotations to learn:

- 'Into the valley of Death'
- 'Came thro' the jaws of Death/Back from the mouth of Hell'
- 'Honour the Light Brigade'



Exposure

Poet: Wilfred Owen
Born: 1893

3 key quotations to learn:

- 'merciless iced east winds that knife us'
- 'But nothing happens'
- 'What are we doing here?'



Storm on The Island

Poet: Seamus Heaney
Born: 1939

3 key quotations to learn:

- 'S'plits like a tamed cat turned savage'
- 'we are bombarded by the empty air'
- 'it is a huge nothing that we fear'



Bayonet Charge

Poet: Ted Hughes
Born: 1930

3 key quotations to learn:

- 'The patriotic tear'
- 'in what cold clockwork of the stars and nations was he the hand pointing'
- 'King, honour, human dignity, etcetera dropped like luxuries'

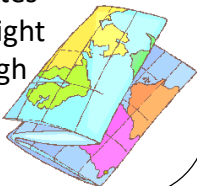


Tissue

Poet: Imtiaz Dharker
Born: 1954

3 key quotations to learn:

- 'The sun shines through their borderlines'
- 'what was paid by credit card might fly our lives like paper kites'
- 'let the daylight break through capitals and monoliths'



The Emigrant

Poet: Carol Rumens
Born: 1944

3 key quotations to learn:

- 'that child's vocabulary I carried here like a hollow doll'
- 'my city comes to me in its own white plane'
- 'They accuse me of absence, they circle me'



Checking Out Me History

Poet: John Agard
Born: 1949

3 key quotations to learn:

- 'Dem tell me dem tell me wha dem want to tell me'
- 'blind me to me own identity'
- 'a yellow sunrise to the dying'



Recap on Literature Success Criteria:

- Method
- Quotation
- Explain
- Words- analyse
- Effect/impression on reader/ audience
- Writer's purpose linked to context



English Literature: A Christmas Carol

"If you believe you can achieve!"

10 Key Quotations to learn

1. Narration: 'The cold within him froze his old features.'
2. Scrooge: "...decrease the surplus population."
3. Narration: 'hard and sharp as flint'
4. Narration: 'solitary as an oyster'
5. Marley: "I wear the chain I forged in life"
6. Scrooge: "What Idol has replaced you?" Belle: "A golden one."
7. Ghost of Christmas Present: "This boy is Ignorance. This girl is Want."
8. Scrooge: "I will honour Christmas in my heart."
9. Scrooge: "I am as light as a feather."
10. Scrooge: "I am as merry as a schoolboy."



Characters

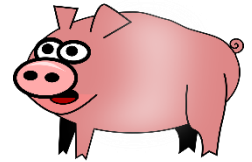
Ensure you know the importance of each character:

- Ebenezer Scrooge
- Jacob Marley
- Fezziwig
- Fan
- Bob Cratchit
- Tiny Tim
- Ghost of Christmas Past
- Ghost of Christmas Present
- Ghost of Christmas Yet to Come



Social and Historical Context.
Learn this mnemonic (PIGS) to help you recall the main contextual points

- Poverty and the Poor Law
- Industrial Revolution
- Ghosts and Spirits
- Social Responsibility



Charles Dickens

- He was a writer and social critic.
- He was born in Portsmouth, England, in 1812.
- He left school to work in a factory when his father was imprisoned for debt.
- Three of his most famous works are Oliver Twist, Great Expectations and A Christmas Carol.
- He felt strongly about social injustice and, in particular, the way children were treated.



Reading Questions and Success Criteria for each:

Question 1- List 4 things/4 facts.



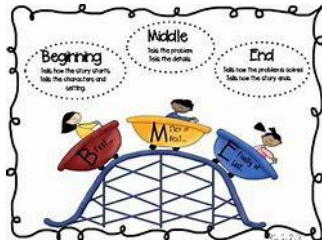
Question 2- Language Question

- Method (e.g. metaphor, simile, adjective)
- Quotation (this implies...)
- Word/s (including word class)
- Explanation (Mood, image, effect)



Question 3 – Structure (beginning, middle, end)

- (Structural) Method-Shift in Focus
- Quotation
- Effect
- Focus
- Purpose



Question 4- Evaluate a statement e.g. 'In this story, the characters are realistic. How much do you agree?'

Agree/Disagree

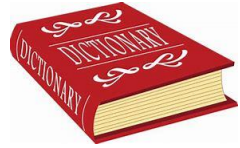
- Method & Quotation
- Link
- Explain



Writing Question and Success Criteria for each:

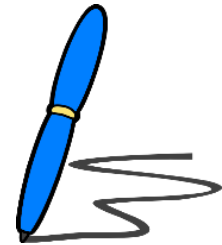
Question 5- Describe the picture or write a story-

- Write 5 paragraphs minimum.
- Use MRPASSO methods (see below).
- Use ambitious vocabulary.
- Use a full range of punctuation accurately.
- Use a variety of sentence types (ISPAC can be useful- see Half Term 1 for a reminder).
- Use well-planned paragraphs.



The writing question is worth 40 marks in your exam which half of all available marks. Using MRPASSO methods will improve the standard of your writing:

- M- Metaphor
- R- Repetition
- P- Personification
- A- Alliteration
- S- Senses
- S- Similes and Metaphors
- O- Onomatopoeia



Advice for this paper:

- Read! This is a fiction paper where you need to read a fictional extract and comment on it, then write your own piece of fiction.**
- Try reading a variety of short stories and novels.**
- Use your weekly reading lessons in the LRC to choose new and challenging texts to read.**

Reading Questions and Success Criteria for each:

Question 1- Shade in 4 true statements (out of 8)



Question 2- Summarise the differences in....in Source A and in Source B- 2 or 3 times- **NO METHODS**

- Statement on Source A
- Quote
- Inference



- Statement on Source B
- Quote
- Inference

Question 3- Language Question

- Method (e.g. metaphor, simile, adjective)
- Quotation (this implies...)
- Word/s (including word class)
- Explanation (Mood, image, effect)



Question 4- Compare writers' viewpoints in Source A and B

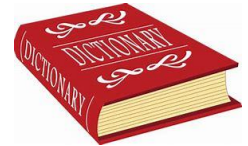
- Viewpoint
- Quotation
- Method
- Explain
- Compare



Writing Question and Success Criteria for each:

Question 5- Writing to argue/explain/persuade

- Write 5 paragraphs minimum
- Use RAPTORS methods (see below)
- Use ambitious vocabulary
- Use a full range of punctuation accurately
- Use a variety of sentence types
- Use well-planned paragraphs



The writing question is worth 40 marks in your exam which half of all available marks. Using RAPTORS methods will improve the standard of your writing. You should have learned these methods in Year 7:

- R- Rhetorical Question
- A- Alliteration
- P- Personal Pronouns
- T- Triplets
- O- Over exaggeration
- R- Repetition
- S- Statistics and Facts



Advice for this paper:

- Read! This is a non-fiction paper where you need to read a non-fiction extract and comment on it, then write your own piece of non-fiction.
- Try reading a variety of non-fiction texts and in particular, good quality broadsheet newspapers such as The Guardian, The Times and I.



MATHS

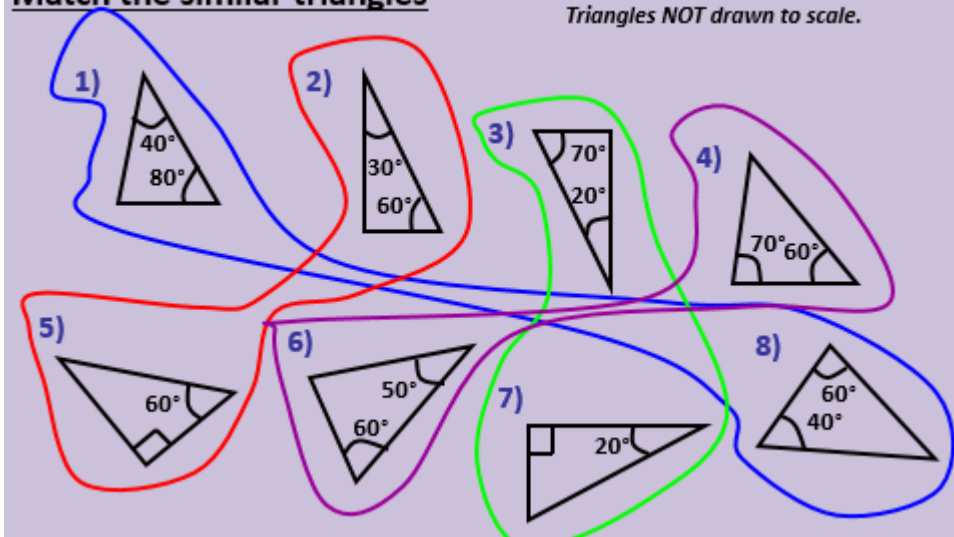
Similarity and enlargement

Shapes are similar if one is an enlargement of the other:

- All angles must be equal
- All sides must have the same scale factor

Match the similar triangles

Triangles NOT drawn to scale.

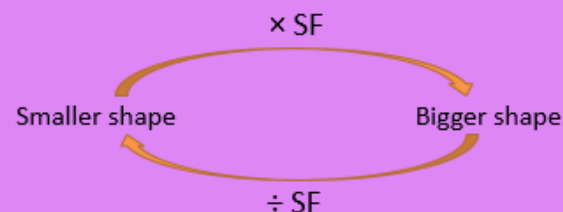


More similarity

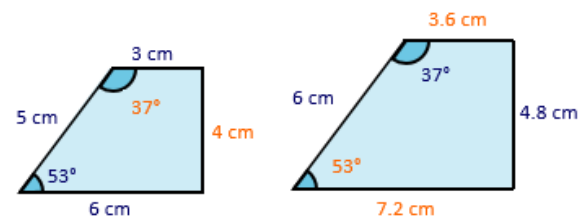
Work out the SCALE FACTOR of the enlargement

$$\text{Scale factor} = \frac{\text{length on BIGGER shape}}{\text{matching length on SMALLER shape}}$$

Use this scale factor to find missing sides using their matching side on the other shape

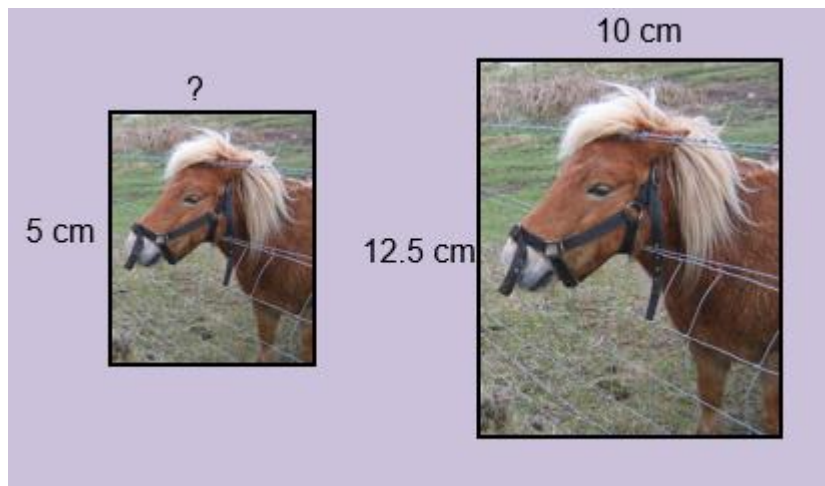


The following shapes are similar. What is the size of each missing side and angle?



The scale factor for the enlargement is $\frac{6}{5} = 1.2$

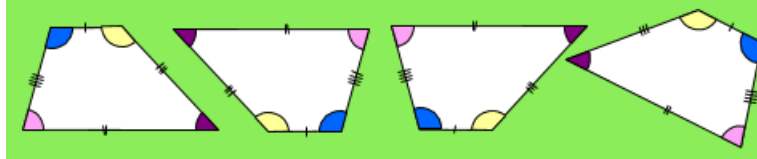
Using similarity



$$? = 4 \text{ cm}$$

Congruence 1

- Congruent means that two shapes are **exactly the same shape and size**
 - All sides are the same length
 - All angles are equal
- Translations, reflections and rotations all create images which are congruent to the original object



Congruent shapes have all sides and angles equal.

Similar shapes have all angles equal but one is an enlargement of the other.

Vectors 1

Adding and Subtracting Vectors Examples

$$\begin{bmatrix} 2 \\ 5 \end{bmatrix} + \begin{bmatrix} 1 \\ -7 \end{bmatrix} = \begin{bmatrix} 2+1 \\ 5+(-7) \end{bmatrix} = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$$

$$\begin{bmatrix} -3 \\ 6 \end{bmatrix} - \begin{bmatrix} -2 \\ -4 \end{bmatrix} = \begin{bmatrix} -3-(-2) \\ 6-(-4) \end{bmatrix} = \begin{bmatrix} -1 \\ 10 \end{bmatrix}$$

Vectors 2

$$k \begin{bmatrix} a \\ b \end{bmatrix} = \begin{bmatrix} ka \\ kb \end{bmatrix}$$

Two vectors are parallel if one is a scalar multiple of the other.

SCIENCE

Glossary:

- **Allele**

different forms of the same gene sometimes referred to as variants.

- **Chromosome**

the structure made of DNA that codes for all the characteristics of an organism.

- **Dominant**

the phenotype will be apparent in the offspring even if only one of the alleles is inherited.

- **Evolution**

is a change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species.

- **Gamete**

Sex cell (sperm in males and ova/eggs in females).

- **Gene**

The basic unit of genetic material inherited from our parents. A gene is a section of DNA.

- **Genotype**

the genetic makeup of an individual for a particular characteristic, for example hair or eye colour.

- **Heterozygous**

individual with different alleles for a characteristic.

- **Homozygous**

individual with two identical alleles for a characteristic.

- **Phenotype**

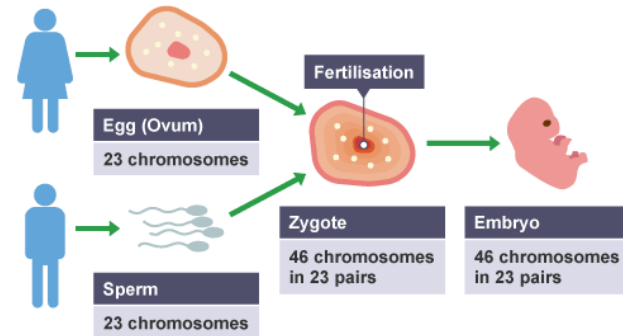
the physical appearance / biochemistry of an individual for a particular characteristic.

- **Recessive**

a phenotype that will only show up in the offspring if both of the alleles coding for that characteristic are inherited.

Sexual reproduction involves the joining (fusion) of male and female gametes:

- sperm and egg cells in animals



- pollen and egg cells in flowering plants.

In sexual reproduction there is mixing of genetic information which leads to variety in the offspring.

The formation of gametes involves meiosis.

Asexual reproduction involves only one parent and no fusion of gametes.

There is no mixing of genetic information.

This leads to genetically identical offspring (clones).

Only mitosis is involved.

Year 11 Biology Term 1: Inheritance, Variation and Evolution

"If you believe you can achieve!"

Meiosis

Cells in reproductive organs divide by meiosis to form gametes.

When a cell divides to form gametes:

- copies of the genetic information are made
- the cell divides twice to form four gametes, each with a single set of chromosomes
- all gametes are genetically different from each other.

Gametes join at fertilisation to restore the normal number of chromosomes. The new cell divides by mitosis. The number of cells increases. As the embryo develops cells differentiate.

Some disorders are inherited.

These disorders are caused by the inheritance of certain alleles.

- Polydactyly (having extra fingers or toes) is caused by a dominant allele.
- Cystic fibrosis (a disorder of cell membranes) is caused by a recessive allele.

The genetic material in the nucleus of a cell is composed of a chemical called DNA.

DNA is a polymer made up of two strands forming a double helix.

The DNA is contained in structures called chromosomes.

A gene is a small section of DNA on a chromosome.

Each gene codes for a particular sequence of amino acids, to make a specific protein.



Ordinary human body cells contain 23 pairs of chromosomes.

22 pairs control characteristics only, but the 23rd the pair carries the genes that determine sex.

Gametes	X	Y
X	XX	XY
X	XX	XY

- In females the sex chromosomes are the same (XX).
- In males the chromosomes are different (XY).

The theory of evolution by natural selection states that all species of living things have evolved from simple life forms that first developed more than three billion years ago.

Selective breeding (artificial selection) is the process by which humans breed plants and animals for particular genetic characteristics

Glossary:

• Finite resource

A resource that isn't replaced at a quick enough rate to be considered replaceable.

• Renewable resource

A resource that can be made at the same or similar rate as it's being used.

• Natural resource

A resource formed without human input.

• Sustainable development

An approach to development that takes into account the needs of present society while not damaging the lives of those in the future.

• Life cycle assessment

An assessment of the

environmental impact of a product over the course of its life.

• Bioleaching

The process by which a metal is separated from its ore using bacteria.

• Phytomining

The process by which a metal is extracted from soil by using plants.

• Potable water

Water that is safe for drinking.

• Pure substance

A substance that only contains one substance (compound or element) throughout.

• Distillation

A way of separating out a liquid from a mixture.

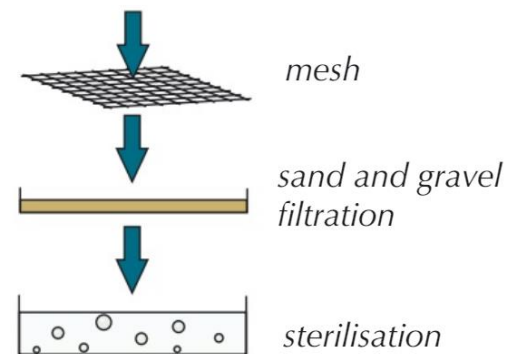
Sustainable development

Humans use the Earth's resources to provide warmth, shelter, food and transport. Natural resources, supplemented by agriculture, provide food, timber, clothing and fuels. Finite resources from the Earth, oceans and atmosphere are processed to provide energy and materials. Chemistry plays an important role in improving agricultural and industrial processes to provide new products and in sustainable development.

Potable water

Water of appropriate quality is essential for life. For humans, drinking water should have sufficiently low levels of dissolved salts and microbes. Potable water is not pure water in the chemical sense because it contains dissolved substances. The methods used to produce potable water depend on available supplies of water and local conditions. In the United Kingdom (UK), rain provides water with low levels of dissolved substances (fresh water) that collects in the ground and in lakes and rivers, and most potable water is produced by:

- choosing an appropriate source of fresh water
- passing the water through filter beds
- sterilising



Sterilising agents used for potable water include chlorine, ozone or ultraviolet light. If supplies of fresh water are limited, desalination of salty water or sea water may be required. Desalination can be done by distillation or by processes that use membranes such as reverse osmosis. These processes require large amounts of energy.

Year 11 Chemistry Term 1: Using Resources

"If you believe you can achieve!"

Potable water RPA –

Distillation

1) Test the pH of the water using pH meter or universal indicator.

If pH is too high or low, you'll need to neutralise it.

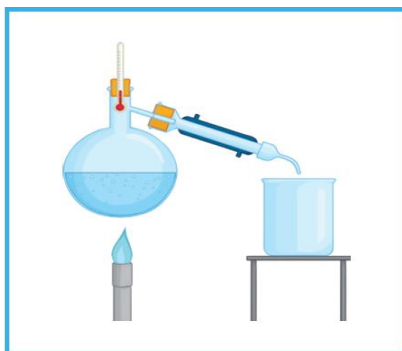
2) Set up the equipment as shown in the diagram.

3) As the water in the flask heats up, it'll evaporate (becomes a gas). The evaporated water enters the condenser as steam. The drop in temperature inside the condenser, due to the cold water around it, will cause the steam to condense back into

liquid water.

4) Collect the water running out of the condenser in a conical flask/beaker.

5) Retest the pH to ensure solution is neutral. Salt crystals remain in the round bottomed flask.



Potable water RPA –

Dissolved solids

1) Tare the weighing balance by pressing the 'Tare' button on the weighing balance.

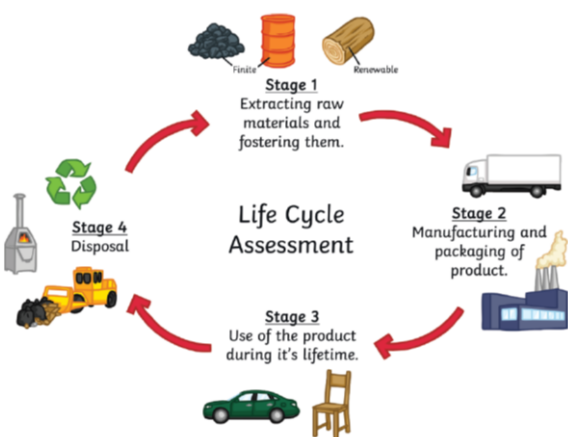
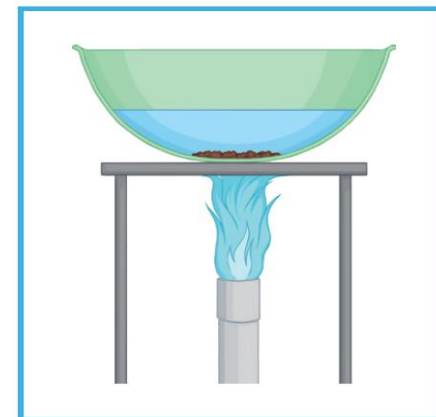
2) Accurately weigh an empty evaporating basin and record to two decimal places.

3) Measure 10 ml of sample 1 and transfer the liquid into the evaporation basin.

4) Use the universal indicator paper to measure the pH of the water sample.

5) Heat the evaporating basin on a tripod and gauze using a Bunsen burner until the solids start to form and the majority of water has evaporated.

6) Weigh the cooled evaporating basin again and calculate the mass of the solids that were dissolved in the water.
7) Record your results in a table.
8) Repeat steps 1–7 with other samples.



Life Cycle Assessments

The stages of the lifetime of a product can be seen as: 1) Getting the raw materials, 2) Manufacturing and packaging, 3) Using the product, 4) Product disposal.

At each stage certain factors need to be considered, including the amount of energy that is needed, how much water and other resources are used, the amount of pollution produced, how much waste is formed and how this waste is disposed of.

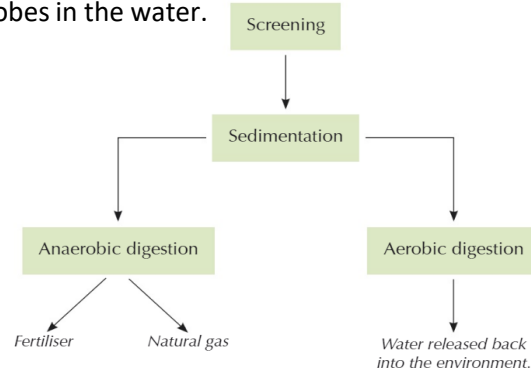
Life Cycle Assessment Stage	Plastic Bag	Paper Bag
Raw Materials	Crude oil	Timber
Manufacturing and Packaging	The compounds needed to make the plastic are extracted from crude oil by fractional distillation, followed by cracking and then polymerisation. Waste is reduced as the other fractions of crude oil have other uses.	Pulped timber is processed using lots of energy. Lots of waste is made.
Using the Product	Can be reused. Can be used for other things as well as shopping, for example bin liners.	Usually only used once.
Product Disposal	Recyclable but not biodegradable and will take up space in landfill and pollute land.	Biodegradable, non-toxic and can be recycled.

Waste water treatment

- 1) **Screening** – Before being treated the sewage is screened – this involves removing any large bits of material (like twigs or plastic bags) as well as any grit.
- 2) **Sedimentation** – The screened waste is allowed to stand in a settlement tank and undergoes sedimentation. The heavier suspended solids sink to the bottom to produce sludge while the less
- 4) **Anaerobic digestion** – The sludge from the bottom of the settlement tank is also removed and transferred into large tanks. Here it gets broken down by bacteria in a process called anaerobic digestion. Anaerobic digestion breaks down the organic matter in the sludge, releasing methane gas in the process. The methane gas can be used as an energy source and the remaining digested waste can be used as a fertiliser.

dense effluent floats on the top.

- 3) **Aerobic digestion** – The effluent in the settlement tank is removed and treated by biological aerobic digestion. This is when air is pumped through the water to encourage aerobic bacteria to break down any organic matter, including other microbes in the water.



Reducing impact



The reduction in use, reuse and recycling of materials by end users reduces the use of limited resources, use of energy sources, waste and environmental impacts. Metals, glass, building materials, clay ceramics and most plastics are produced from limited raw materials. Much of the energy for the processes comes from limited resources. Obtaining raw materials from the Earth by quarrying and mining causes environmental impacts. Some products, such as glass bottles, can be reused. Glass bottles can be crushed and melted to make different glass products. Other products cannot be reused and so are recycled for a different use.

Metals can be recycled by melting and recasting or reforming into different products. The amount of separation required for recycling depends on the material and the properties required of the final product. For example, some scrap steel can be added to iron from a blast furnace to reduce the amount of iron that needs to be extracted from iron ore.

Metal extraction (HT only)

The metal compounds can be processed to obtain the metal. For example, copper can be obtained from solutions of copper compounds by displacement using scrap iron or by electrolysis.

The Earth's resources of metal ores are limited. Copper ores are becoming scarce and new ways of extracting copper from low-grade ores include phytomining, and bioleaching. Low-grade ores contain only a very small amount of copper. Therefore, it is harder to extract the copper economically from these ores.

These methods avoid traditional mining methods of digging, moving and disposing of large amounts of rock.

Phytomining – plants are grown on land containing the metal compounds. The plants absorb the metal compound and they concentrate it in their tissue. The plants are then harvested and burned. At the end, the ash contains a relatively high concentration of the metal compound.

Bioleaching – bacteria are mixed with the low-grade ore. The bacteria convert copper compounds in the ore into soluble copper compounds, separating out the copper from the ore in the process. The leachate (the solution produced by the process) contains copper ions, which can be extracted by electrolysis or displacement.

Year 11 Physics Term 1: Waves

Glossary:

• **Wavelength**

Distance from one point on a wave to the same point of the next wave

• **Amplitude**

The maximum disturbance from its rest position

• **Frequency**

Number of waves per second#

• **Period**

Time taken to produce 1 complete wave

• **Transverse wave**

Vibration causing the wave is at right angles to the direction of energy transfer

• **Longitudinal wave**

Vibration causing the wave is parallel to the direction of energy transfer

• **Electromagnetic spectrum**

Continuous spectrum of transverse waves that travel at the same speed in a vacuum or air.

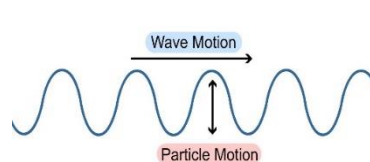
Equations:

Wave speed (m/s) = frequency (Hz) X wavelength (m)

Wave period = $1 \div \text{frequency (Hz)}$

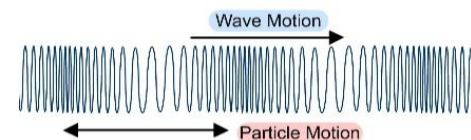
Speed (m/s) = distance (m) \div time (s)

Transverse waves



For example: Water and light waves

Longitudinal wave



- Show areas of compression and rarefaction
- For example sound waves travelling through air.

Identifying the parts of a wave



The electromagnetic (EM) spectrum.

- A continuous spectrum formed from electromagnetic waves.
- EM waves are transverse waves.
- All EM waves travel at the same velocity through a vacuum or air (300 000 000 m/s).
- Grouped according to wavelength and frequency.
- The eye can only detect visible light.

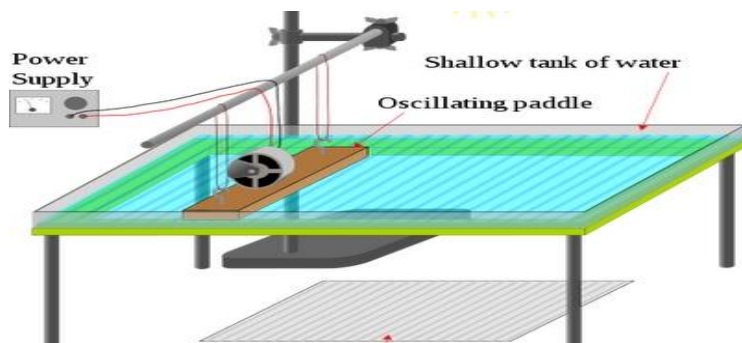
Long wavelength \longrightarrow Short wavelength

Radio waves	Microwaves	Infrared	Visible light	Ultraviolet	X-rays	Gamma rays
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Low frequency \longrightarrow High frequency

Year 11 Physics Term 1: Waves

Required practical : Ripple tank.



To measure frequency:

- Use a stopwatch.
- Count the number of waves that pass a certain point in a given time period.
- Divide the number of waves by the time to find out the time for one wave (T)
- Frequency = $1/T$

To measure wavelength:

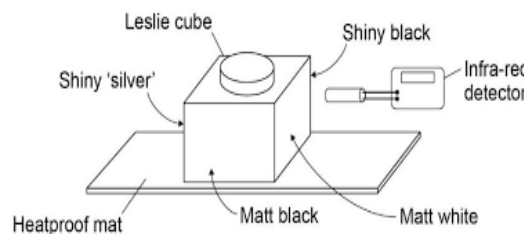
- Use a camera to freeze the image
- Use a metre rule to measure the distance between two wavefronts.
- Count the number of waves between the wavefronts.
- Wavelength = distance divided by number of waves.

To measure waves speed

- Determine mean values for frequency and wavelength.
- Measure time taken for one wavefront to travel the length of the screen.
- Measure the length of the screen.
- Speed = distance / time

EM wave	Danger	Use
Radio	Safe.	Communications, TV, radio.
Microwave	Burning if concentrated.	Mobile phones, cooking, satellites.
Infrared		Heating, remote controls, cooking.
Visible	Damage to eyes.	Illumination, photography, fibre optics.
Ultra violet	Sunburn, cancer.	Security marking, disinfecting water.
X-ray	Cell destruction, mutation, cancer.	Broken bones, airport security.
Gamma		Sterilising, detecting and killing cancer.

Required practical: Infrared Radiation



Black surfaces	Good emitters, good absorbers
White surfaces	Poor emitters, poor absorbers
Shiny surfaces	Good reflectors

- Infrared radiation given out by hot objects.
- How much is absorbed or depends on the surface.

Refraction

- When light travels into a different medium it will refract.

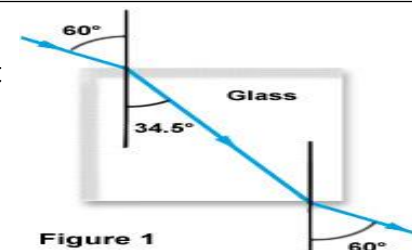
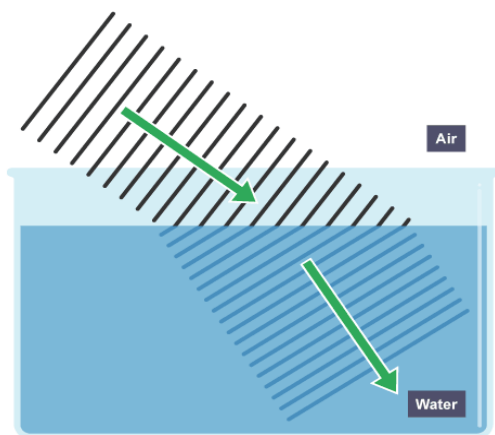


Figure 1

Refraction.

- Affected by the density of a material.
- The more dense a material, the slower the light will travel through it. Eg glass is more dense than air so light travels slower through glass than it does air.
- For a given frequency the wavelength is proportional to the wave speed.
- If the wave slows down then the wavelength will decrease.



The diagram shows that as a wave travels into a denser medium, such as water, it slows down and the wavelength decreases. Although the wave slows down, its frequency remains the same, due to the fact that its wavelength is shorter.

The right hand side of the incoming wave slows down before the left hand side does. This causes the wave to change direction.

EM Waves

Radio waves

- Transmitted easily through air.
- Can be reflected to change their direction.
- These properties make them ideal for communications.
- Radio waves can be produced by **oscillations** in electrical circuits. When radio waves are absorbed by a **conductor**, they create an **alternating current**.
- This electrical current has the same frequency as the radio waves. Information is coded into the wave before transmission, which can then be decoded when the wave is received.
- Television and radio systems use this principle to broadcast information.

Microwaves

- High frequency microwaves have frequencies which are easily absorbed by molecules in food.
- The **internal energy** of the molecules increases when they absorb microwaves, which causes heating.
- Microwaves pass easily through the atmosphere, so they can pass between stations on Earth and satellites in orbit.

Infrared

- Infrared light has frequencies which are absorbed by some chemical bonds.
- The internal energy of the bonds increases when they absorb infrared light, which causes heating.
- This makes infrared light useful for electrical heaters and for cooking food.
- All objects emit infrared light.
- The human eye cannot see this light but infrared cameras can detect it.

Glossary:

- **Base**

Substances that react with acids in neutralisation reactions

- **Alkali**

A base that is soluble in water

- **Salt**

The product formed when an acid reacts with a base

- **Neutralisation**

The reaction between an acid and an alkali to produce a salt and water

- **Reactivity series**

A list of metals arranged in order of how reactive they are

- **Displacement reaction**

When a more reactive metal replaces a less reactive one out of a compound. A type of redox reaction.

- **Metal ore**

A rock containing enough metal to make it profitable to extract

the metal from it. Often, but not always, on oxide.

- **Oxidation**

The gain of oxygen by an element or compound or the loss of electrons.

- **Reduction**

The loss of oxygen from a compound or the gain of electrons

- **Redox reaction (higher)**

When electrons are transferred between substances and both oxidation and reduction occur simultaneously.

- **OILRIG**

Oxidation Is Loss (of electrons),
Reduction Is Gain (of electrons)

- **Ionic equations (higher)**

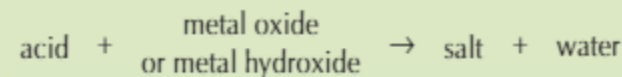
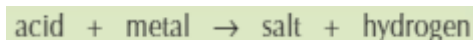
Show only the particles that react and the products formed.

- **Electrolysis**

Splitting a substance up using electricity

Reactivity of metals

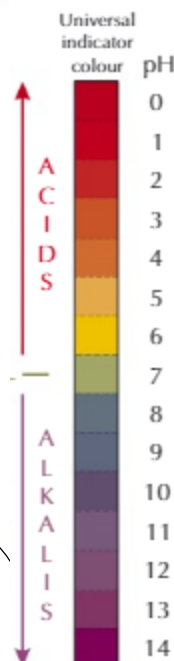
Metals that are more likely to ionise (lose electrons) are more reactive. Reactivity can be measured by comparing rate that gas is produced.



Reactivity series and extraction of metals

If metal is below C in reactivity series it is extracted by heating with C. C is oxidised and the ore is reduced. If metal is more reactive than carbon, it is extracted by electrolysis.

The Reactivity Series		
Extracted using electrolysis.	Potassium	K
	Sodium	Na
	Lithium	Li
	Calcium	Ca
	Magnesium	Mg
	<u>Carbon</u>	C
Extracted by reduction using carbon.	Zinc	Zn
	Iron	Fe
	Hydrogen	H
	Copper	Cu



Naming salts

- Hydrochloric acid forms chloride salts
- Nitric acid forms nitrate salts
- Sulfuric acid forms sulfate salts

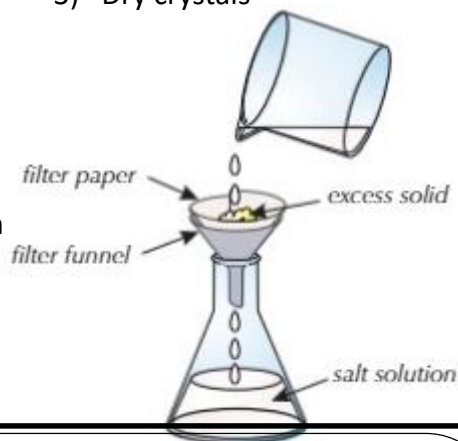
RPA – making soluble salts

Soluble salts can be made by reacting an acid with a metal or insoluble base:

- 1) Put acid in a beaker. Gently warm acid using Bunsen Burner
- 2) Add insoluble reactant (usually metal oxide or metal carbonate) and stir
- 3) Keep adding insoluble reactant until it is in excess
- 4) Filter out excess insoluble reactant to get salt solution

Get pure, solid crystals by crystallisation:

- 1) Heat solution using water bath or heater
- 2) Stop heating and leave solution to cool
- 3) Dry crystals

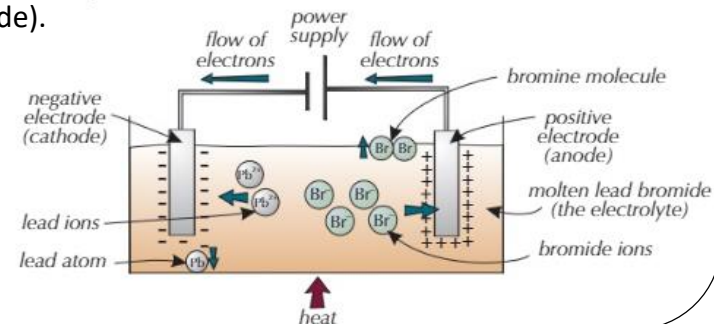


Strength and concentration of acids (higher only)

- Acids produce H^+ ions when in an aqueous solution.
- Strong acids dissociate fully and produce lots of H^+ ions, weak acids only dissociate partially.
- The higher the concentration of H^+ ions, the more reactive the acid
- The lower the pH, the higher the concentration of H^+ ions. A decrease of 1 on pH scale = increase in factor of 10 of H^+ ions.
- Concentration of acid = number of acid molecules in a volume, not number of dissociated molecules

Electrolysis theory

Compound to be split needs to be ionic and molten/aqueous. Positive ions (cations) are attracted to the negative electrode (cathode). Negative ions (anions) are attracted to the positive electrode (anode).



Electrolysis theory (higher)

- Reduction occurs at the cathode, oxidation occurs at the anode
- Half equations show the reactions at each electrode, eg:

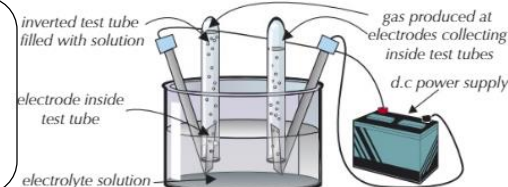


- If electrolyte is in solution, more than one product is made at the electrode:

Cathode – H_2 produced if metal is more reactive than H. Metal produced if it is less reactive than H.

Anode – Halogen gas produced if halide ions present. Oxygen gas and water produced if no halide ions.

Electrolysis RPA – to be able to identify what has been made in an electrolysis experiment.



Glossary:

- **Magnetic**

Materials attracted by magnets

- **Magnetic field**

Region of force around magnet

- **Permanent magnet**

A magnet that produces its own magnetic field

- **Induced magnet**

A temporary magnet that becomes magnet when placed in a magnetic field

- **North seeking pole**

End of magnet pointing north

- **South seeking pole**

End of magnet pointing south

- **Magnetic flux**

Lines drawn to show magnetic field. Lots of lines = stronger magnets.

- **Magnetic flux density**

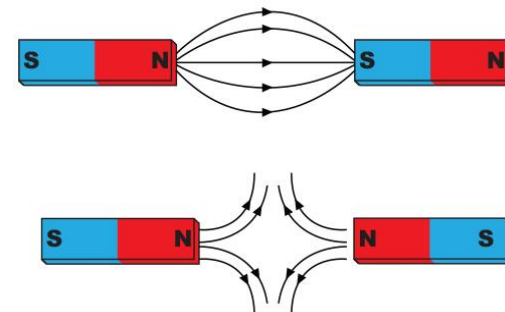
Number of lines of magnetic flux in a given area

Equation:

Force (N) = Magnetic flux density (T) x current (A) x length (m)

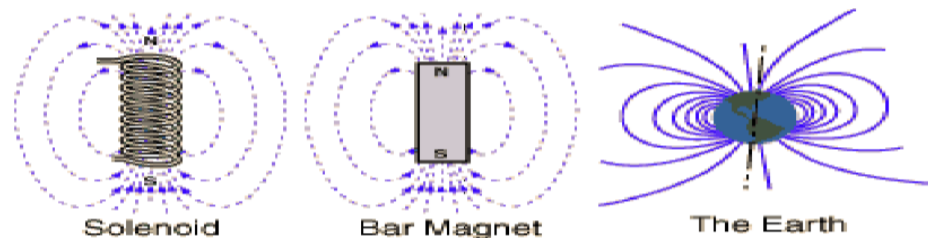
Poles of a magnet.

- where the magnetic forces are strongest.
- When two magnets are brought close together they exert a force on each other..
- Two like poles repel each other.
- Two unlike poles attract each other.
- Attraction and repulsion between two magnetic poles are examples of non-contact force



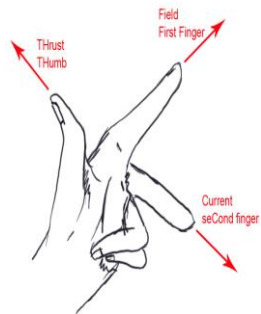
Magnetic fields.

- Region around a magnet where a force acts on another magnet or on a magnetic material (iron, steel, cobalt and nickel).
- The force between a magnet and a magnetic material is always one of attraction.
- The strength of the magnetic field depends on the distance from the magnet.
- The field is strongest at the poles of the magnet.
- The direction of a magnetic field line is from the north (seeking) pole of a magnet to the south (seeking) pole of the magnet.
- A magnetic compass contains a small bar magnet. The Earth has a magnetic field. The compass needle points in the direction of the Earth's magnetic field.



Fleming's left hand rule (Higher only)

- When a conductor carrying a current is placed in a magnetic field the magnet producing the field and the conductor exert a force on each other.
- This is called the motor effect
- Fleming's left-hand rule represents the relative orientation of the force, the current in the conductor and the magnetic field.



Thumb	Direction of movement.
First finger	Direction of magnetic field.
Second finger	Direction of current.

- For any given combination of current and magnetic field strength, the force is greatest when the direction of the current is 90° to the direction of the magnetic field.
- There is no **motor effect** force if the current and magnetic field are parallel to each other.

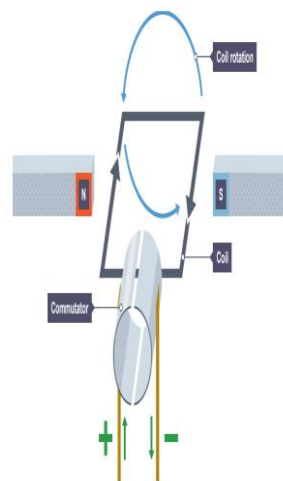
Electric motors (Higher only)

- A coil of wire carrying a current in a magnetic field experiences a force that tends to make it rotate.
- This effect can be used to make an electric motor.

Electromagnetism

- When a current flows through a conducting wire a magnetic field is produced around the wire.
- The strength of the magnetic field depends on the current through the wire and the distance from the wire.
- Shaping a wire to form a solenoid increases the strength of the magnetic field created by a current through the wire.
- The magnetic field inside a solenoid is strong and uniform.
- The magnetic field around a solenoid has a similar shape to that of a bar magnet.
- Adding an iron core increases the strength of the magnetic field of a solenoid.
- An electromagnet is a solenoid with an iron core.

Electric motors (Higher only)



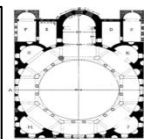
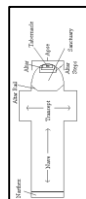
- current in the left hand part of the coil causes a downward force, and current in the right hand part of the coil causes an upward force
- the coil rotates anti-clockwise
- When the coil is vertical, it moves parallel to the magnetic field, producing no force. This would tend to make the motor come to a stop, but two features allow the coil to continue rotating:
the momentum of the motor carries it on round a little
a split ring commutator changes the current direction every half turn
Once the conducting brushes reconnect with the commutator after a half turn:
current flows in the opposite direction through the wire in the coil
each side of the coil is now near the opposite magnetic pole
This means that the motor effect forces continue to cause anti-clockwise rotation of the coil.

RE

Key Word	Definition
Atonement	To make up for; in Christianity the restoration of the relationship between God and humans which was mended by Christ's sacrifice
Charismatic Movement	An active style of Christian worship may include dancing and lively music
Frescoes	Murals painted on fresh plaster
Hunger Cloth	Used during the middle ages to cover the altar during Lent, they were covered in images and stories from the Bible.
Iconoclasm	The destruction of religious icons and other images for religious or political motives
Responsorial	A chant recited in parts which includes a response by the congregation between each part
Sarcophagi	A box-like container for a corpse, usually carved in stone and displayed above ground.
Sacred Vessels	Objects used a part of the liturgy in Catholic Mass
The Evangelists	The four Gospel writers who have been linked to the four living creatures said to have surrounded God's throne
Votive	A vow, wish or desire

Catholic church architecture:

- The word 'church' means the 'House of the Lord', church buildings are an important place for Catholics to pray and worship.
- Church building design often reflects key beliefs in Catholicism.
- It is not essential for people to worship in a church building; "worship is not tied exclusively to any one place" CCC. The Church is the body of Christ – it is the community that matters more than the building.
- However, "church buildings make visible the Church living in this place" CCC. Attending Mass in a church building means you are surrounded by reminders of the faith.



Churches usually have one of the following shapes;
Cruciform,
Octagonal or
Round



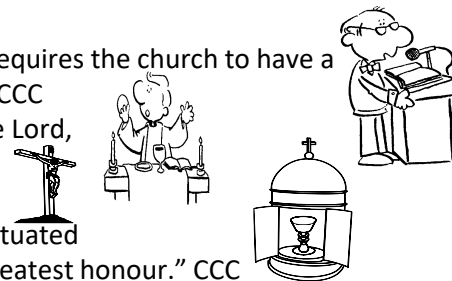
Other architectural features are:

- Built facing East
- Stained Glass Windows
- Towers
- High vaulted ceilings

Catholic Church Features: The internal features of a Catholic church have clear and distinct purposes, they help Catholics in their worship and prayer life.

Four centrally important features are:

- **Lectern** "The dignity of the Word of God requires the church to have a suitable place for announcing his message" CCC
- **The Altar** "The altar is also the table of the Lord, to which the People of God are invited." CCC
- **The Crucifix**
- **The Tabernacle** "The tabernacle is to be situated in churches in a most worthy place with the greatest honour." CCC



These particularly reflect Jesus' sacrifice, atonement and reconciliation with God. Other features of note include the baptismal font, confessional, stations of the cross, statues and the holy water stoup.

Sacred Objects:

• Sacred objects refer to things such as rosary beads, relics, candles and holy water. They may be called objects of devotion.

• Sacred objects help Catholics to focus during worship.
Sacred vessels have a role during worship and include the ciborium, chalice and paten. These are used by the priest in the celebration of the Eucharist.

• **Sarcophagi** are still used today and help Catholics focus their prayers on an individual, the current Pope will visit the sarcophagi of his predecessors.

• **Hunger cloths** were traditionally used to cover the altar during lent. They tell stories of God helping people in the Bible and are still used in developing countries to give people hope, a good example is one explained by CAFOD called 'Encountering God In The Stranger.'



Sculptures and Statues:

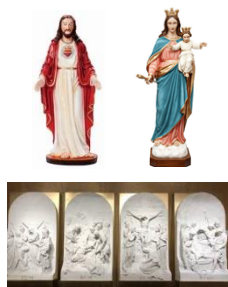
Statues and sculptures are a way of remembering individuals, stories and teaching from the Bible and the saints.

They are used by Catholics in the home and church as a focus for prayer and a reminder of their faith in their daily lives.

• Most Catholic churches contain statues. They may have a chapel dedicated to Mary or a saint, which would usually have a statue. The stations of the cross are usually sculptures.

• They are used for a variety of reasons such as to recall the person being depicted, to teach (particularly useful when people could not read,) to help focus prayers and to celebrate a festival (e.g. the nativity scene at Christmas).

• They are not worshipped by Catholics, however, other Christians disagree with their use as they feel it contradicts the commandment about worshipping false idols. As a result sculptures and Statues were destroyed during the reformation.



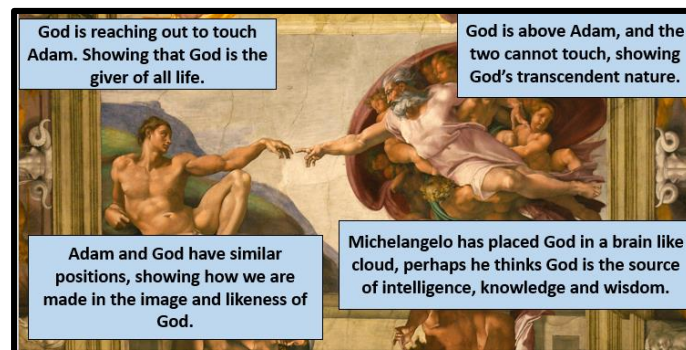
Artwork in Catholicism:

Catholic art has played an important role in the development of Western art. Artwork including paintings, frescos, mosaics and drawings, can help Catholics learn and remember stories from the Bible. Artwork was particularly important when many Catholics could not read or write, as they are relatable and understandable.

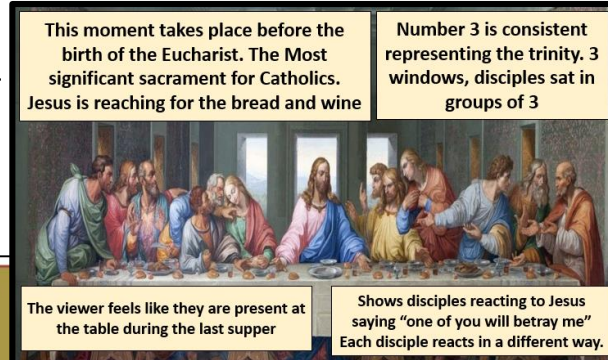
Artwork can also be used as a focus for prayer and meditation. Different types of artwork are acceptable in different churches, therefore some churches will have traditional artwork, while others, will show more contemporary artwork.

The Catechism states art must be "evoking and glorifying, in faith and adoration, the transcendent mystery of God."

Michelangelo's 'Creation of Adam'



Da Vinci's 'Last Supper'




Symbolism and Imagery in Religious Art:

Christians have used symbols from the beginning of their faith. At first it was to avoid detection (the Ichthus/fish symbol)

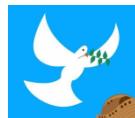
Many symbols including those below are found in the decoration of many churches.

Christian symbols are used by Catholics today to express belief and faith.

The cross/crucifix  **The Ichthus/fish** 

The chi rho  - the 1st 2 letters of the word Christ in Greek.

The dove (CCC) - "Christian iconography traditionally uses a dove to suggest the Spirit."

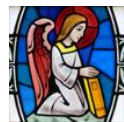


The eagle – a symbol of Jesus' divine nature, commonly used in Protestant churches on the Lectern



The alpha omega $\alpha\omega$ - the 1st and last letters of the Greek alphabet – a symbol of Jesus' eternal nature.

Winged Man:
Matthew's Gospel



The four evangelists.

Winged Lion: Mark's Gospel Winged Ox: Luke's Gospel Eagle: John's Gospel



Music in Worship:

- Plainchant, hymns, psalms and worship songs allow Catholics to join together and pray together through words and music. They help Catholics understand and remember Church teaching. They are used in the Mass and other services to set the tone of the worship.
- Traditional music connects parts of the Mass – the hymns reflect the readings.
- Most Masses will include traditional music such as hymns and psalms.
- More contemporary Christian movements will have worship songs which are often linked to charismatic or youth movements.
- Music helps Catholics to remember and understand Church teaching, it is a great way to evangelise.

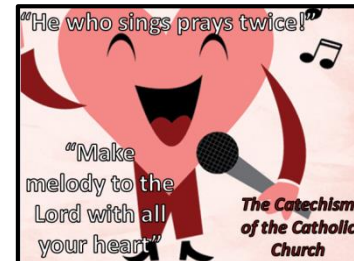
Plainchant



Hymns



Psalms = OT hymns

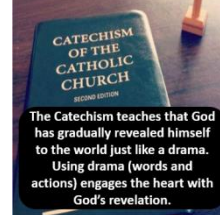


Drama:

- Drama brings Bible stories to life, mystery plays helped people learn and remember Bible stories.
- Passion plays focused on the story of Jesus' death and resurrection.
- The Bible is full of dramatic stories; drama engages people and these stories have been told by Christians and non-Christians alike.
- Drama is useful as a means to help people remember stories and it is a way to bring Christians together through ecumenical performances.
- It is also an excellent form of evangelism, particularly as Passion Plays and Mystery Plays often take place in city centres and include humour and music.
- Dramas may be performed in a church but do not form the worship.



"Drama engages the heart"



HISTORY

C1250-1500: Medicine in medieval England: Ideas about causes of disease

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, discovering the ideas people had about the causes of disease and illness during the Medieval period in England c. 1250-1500. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **Religious Explanations** for causes of disease: as **there was no formal education, ordinary people learnt from the Church. The Church taught that disease was a punishment from God for those who had committed a sin, or a test of faith from the Devil.**
- **Astrology:** People believed that astrology (the alignment of the stars and planets) also had an influence on disease. During diagnosis, physicians would consider star charts, when a patient was born, and when they fell ill. Because God was believed to control everything – including the planets and stars. *For further information, click link 1.*
- **Miasma** was bad air that was believed to be filled with harmful fumes. Both Hippocrates and Galen had written about miasma, which they said came from swamps, corpses and other rotting matter. *For further information click link 2.*
- **The Four Humours :** The theory of the Four Humours said that the body was made up of four elements ('humours') which must be balanced in the body. It was believed that illness was caused by these humours being out of balance. The Theory of the Four Humours was created by Ancient Greek physician Hippocrates and developed by Ancient Rome physician Galen. Galen added to it with the Theory of Opposites, which suggested that the humours could be rebalanced by applying the opposite. For example, someone with too much phlegm (cold) could eat something hot, like a pepper. *For further information, click link 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.hoddereducation.co.uk/media/Documents/History/Edexcel-GCSE-Medicine-sample.pdf>

2

<https://www.senecalearning.com/seneca-certified-resources/medicine-in-britain-1250-present-gcse-edexcel/>

3

<https://www.bbc.co.uk/teach/class-clips-video/medicine-through-time-medieval-medicine/zbctscw>

Glossary

Miasma: Foul air

The Four Humours: A theory that the body was made up of 4 liquids: Black bile, yellow bile, blood and phlegm.

Historical Skills

Describing key features of the past involves identifying relevant features of that aspect of the past and developing a description of them with precise factual information and then comparing them to another time period and carrying out the same detail about how that time period did things similarly or differently.

Part 1 Medicine in Britain, c.1250-present

C1250-1500: Medicine in medieval England: Approaches to prevention and treatment

"If you believe you can achieve!"

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, discovering the approaches to prevention and treatment of disease and illness during the Medieval period in England c. 1250-1500. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

METHODS OF PREVENTION AND TREATMENT:

- **Religious:** included prayer, fasting, paying for a special Mass and pilgrimages.
- **Supernatural:** Using charms and amulets and chanting to ward off diseases and heal symptoms.
- **Astrology:** operations could only be carried out depending on the position of the stars.
- **The Four Humours:**
 - **Blood-letting:** Methods including cupping, leeches and cutting a vein
 - **Purging:** Patients were given emetics (to make them vomit) or laxatives (to empty the bowels).
 - **Theory of Opposites:** The 'opposite' would be applied to an excess humour.
- **Herbal remedies:** used to drink, sniff or bathe in were often used e.g. aloe vera, mint and saffron.
- **Purifying the air:** People purified the air by carrying sweet herbs (lavender) or flowers.
- **Government action:** some action from local government, who tried to tackle miasma by keeping towns clean. E.g. fines. *For further information click link 1.*

HOSPITALS AND CAREGIVERS

- **The number of hospitals increased during the Middle Ages.** Mostly run by monasteries caring for ill/old people – rather than treating and curing them.
- **There were three types of medic:**
 - **Physicians:** university trained included Galen's ideas. They diagnosed illness and recommend a treatment, but they didn't treat the patient themselves. They were very expensive.
 - **Barber surgeons** carried out small operations such as bloodletting. They learned on the job not from books.
 - **Apothecaries** mixed herbal remedies and were cheaper option, sometimes gave poison to purge body. *For further information click link 2 and 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

https://www.youtube.com/watch?v=iH7HJoB_ZO8&list=PL04349AC9C197EC93

2

<https://www.bbc.co.uk/bitesize/guides/evision/4>

3

<https://www.youtube.com/watch?v=hUnzLNK6fMA&list=PL04349AC9C197EC93>

Historical Skill

Students will develop their knowledge and understanding of this period and practise how to answer questions that will target key features and causation and may also target other second order concepts (change, continuity, consequence, similarity, difference, significance).

Glossary

Mass: a Catholic church service

Pilgrimage: a religious journey to prove they are worthy to God

Astrology: Study of the stars

C1250-1500: Medicine in medieval England: Case Study

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, discovering the ideas people had about the causes and treatment of the plague in 1348 during the Medieval period in England c. 1250-1500. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

In 1348 a new plague, the Black Death, reached England. It was spread by fleas (People did not know this at the time) and the main symptom was large, painful buboes. Most victims died within a few days, and around a third of England's population died in all.

CAUSES:

- Religious and supernatural: Many thought the plague was God deserting mankind.
- Astrology: There had also been an unusual positioning of the planets in 1345, which some thought was a bad sign.
- Bad air: Miasma was the main cause associated with the Black Death. People thought it was spread by breathing in impure air. *For further information, click link 1*

TREATMENT:

- Religious and supernatural: People prayed and confessed their sins, although many accepted that it was God's will for you to get the plague.
- Humours treatments: Physicians tried standard treatments like purging and bleeding, but these did not work. Surgeons sometimes lanced (pierced) the buboes, and occasionally these patients would survive.
- Purifying the air: Bonfires and sweet-smelling herbs were used to ward off bad air.
- Herbal remedies: These were used, but like humours treatments, were mostly ineffective. *For further information, click link 2.*

PREVENTION

- Religious and supernatural: People prayed, made pilgrimages and whipped themselves (self-flagellation) to show how sorry they were.
- Purifying the air: One of the main ways of prevention was to carry sweet herbs. People also ran away to escape the bad air in towns, but this only helped to spread the plague. *For further information click link 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.youtube.com/watch?v=P7K92pL77l0&list=PLO4349AC9C197EC93&index=13>

2

<https://ap.p.senecalearning.com/classroom/course/67b0ecb0-38be-11e8-977a-011111111111>

3

<https://www.hoddereducation.co.uk/media/Documents/History/Edeexcel-GCSE-Medicine-sample.pdf>

Historical Skills

Students will develop skills in assessing how far they agree or disagree with a statement about a person or event's importance by selecting relevant evidence, explaining its key features and arguing for and/or against the statement, evaluating and analysing the evidence to come to an overall justified judgement.

Glossary

The Black Death: the plague that killed 1/3 of England's population and arrived in 1348.

Flagellants: whipped themselves to show God they had already been punished for their sins and therefore God should not give them the plague.

Part 1 Medicine in Britain, c.1250-present

C1500-1700: The Medical Renaissance in England: Ideas about causes of disease

"If you believe you can achieve!"

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, discovering the ideas people had about the causes of disease and illness during the Medical Renaissance c. 1500-1700. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

Continuity and change in ideas:

- **Religious Explanations:** Some now recognised that God did not send disease, although in desperate times such as the Great Plague 1665 they still turned to religion.
- **Astrology:** some still believed that astrology influenced disease. Some blamed the 1665 plague on unusual planet alignments from October and November 1664.
- **Miasma:** Most people still believed that miasma caused disease. A miasma could be caused by rotting food, decaying corpses, excrement or any other smelly, dirty place.
- **The Four Humours:** Although many top physicians were now challenging Galen's ideas, most ordinary people continued to believe that illness was caused by an imbalance of humours. *For further information, click link 1.*

A Scientific approach to ideas:

- **Thomas Sydenham:** believed that physicians should closely observe the patient and record their symptoms. Sydenham correctly said that measles and scarlet fever were separate diseases, even though he couldn't identify the individual microbes that caused each. This laid the foundations for future individuals to take a more scientific approach to medicine. *For further information click link 2*
- **Printing press:** New ideas about medicine could be spread more quickly due to the invention of the printing press. Books were no longer copied out by hand in monasteries, which meant that scientists could more easily share new information with each other. The Church – who had promoted Galen's theories – no longer had control over what was published. *For further information click link 3.*
- **The Royal Society:** was an influential group of scientists formed in 1660. Its members shared experiments and promoted scientific ideas. Charles II supported the group, so gave it more credibility.

Glossary

Scarlet Fever: an infectious disease affecting children and causing fever and a scarlet rash.
Renaissance: means 'rebirth'

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.kinged.org.uk/site/data/files/documents/1381676>

2

<https://www.britannica.com/biography/Thomas-Sydenham>

3

<https://www.thesun.co.uk/blog/primacy>

Historical Skills

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Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1500-1700: The Medical Renaissance in England: Approaches to prevention and treatment

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, discovering the approaches to prevention and treatment of disease and illness during the Medical Renaissance c. 1500-1700. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

PREVENTION

- **Lifestyle advice:** Physicians advised avoiding too much exhaustion, fatty foods, strong alcohol and laziness. Public Bathing became less as it was thought syphilis may be caught.
- **Purifying the air/Miasma:** Sewage and rubbish were picked up from the streets, and bonfires were lit in public areas to ward off foul smells.
- **Government:** a more active role, giving fines for not cleaning the street outside homes.

TREATMENTS

- **Herbal remedies:** continued to be used, but they were now chosen because of their colour or shape, e.g. yellow herbs were used to treat jaundice. New herbs from the New World, discovered in 1492, e.g. Tobacco was also used as the smell and taste was believed to ward off miasma.
- **Humours treatments:** people still believed in humours e.g. bloodletting.
- **Transference:** a theory that disease could be transferred to something else by rubbing it.
- **Chemical cures:** Alchemy (an early form of chemistry) looking for chemical cures e.g. mercury. *For further information, click link 1 and 2.*

HOSPITALS & CAREGIVERS

- **Hospitals** had physicians and tried to cure, not just care for patients. Many hospitals closed with the closure of the monasteries.
- **Pest houses:** a new type of hospital for infectious diseases e.g. plague or pox victims.
- **Physicians** continued to learn from books not experience e.g. anatomy.
- **Surgeons:** had to have a licence to practise medicine. Dissections were now allowed.
- **Apothecaries:** had to have a licence to trade. *For further information click link 3.*

Glossary

Jaundice: illness that turns the skin yellow

Mercury: a poisonous chemical that was used to purge patients to remove illness.

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.youtube.com/watch?v=t61uirWN2pl>

2

<https://app.senecalearning.com/classroom/course/67b0ecb0-38be-11e8-977a-0db134efd493/section/6665a0a0-38c1-11e8-8999-cd79d6379685>

3

<https://www.teachithistory.co.uk/resources/ks4/medicine-health/thematic-studies/to-what-extent-did-care-givers->

Historical Skills

Describing key features of the past involves identifying relevant features of that aspect of the past and developing a description of them with precise factual information and then comparing them to another time period and carrying out the same detail about how that time period did things similarly or differently.

C1500-1700: The Medical Renaissance in England: Case Studies

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, **Andreas Vesalius, William Harvey and the The Great Plague** during the Medical Renaissance c. 1500-1700. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

VESALIUS: was an Italian physician and published *On the Fabric of the Human Body* (1543), containing detailed drawings of the human anatomy from dissecting executed criminals. He found mistakes in Galen's work, e.g. the human jawbone was in 1 part, not 2, the human breastbone was in 3 parts, not 7. Vesalius encouraged other doctors to carry out dissections and to investigate the human body. *For further information, click link 1.*

HARVEY: William Harvey published *An Anatomical Account of the Motion of the Heart and Blood* in 1628. He discovered that the heart acted as a pump, pumping blood around the body in a one-way system. He also proved Galen wrong. *For further information click link 2*

CAUSES OF THE GREAT PLAGUE 1665

- Religious: People thought God had sent the plague to clear up the kingdom.
- Planets: There had also been unusual planet alignments the previous year.
- Miasma: bad air, created by rubbish and sewage in cities was the most believed.
- People: Many realised plague was spread from person to person, though they didn't know how.

TREATMENT & PREVENTION OF THE GREAT PLAGUE 1665

- Transference was also tried, e.g. strapping a live chicken to the buboes.
- Herbal remedies continued to be popular E.G. 'PLAGUE WATER'.
- Religious: People were advised to pray and repent their sins.
- Purifying the air: Carrying sweet-smelling herbs, and fires were lit.
- Plague doctors: Plague doctors wore special beaked masks and coated their cloak in wax, so that pus and blood did not soak into it.
- Diet advice: Fasting suggested, as well as specific foods such as a garlic-heavy diet.
- Government orders: The government took a much bigger role in public health, e.g. Quarantine laws, Large crowds banned, Stray animals killed, Streets cleaned. *For further information click link 3.*

Glossary

The Great Plague: broke out across England in 1665. The disease was spread by fleas on rats, and people were as helpless to stop it as they had been during the Black Death.

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific

1

<https://www.youtube.com/watch?v=walfj2dpU-E&list=PLJIGpHXYz>

2

<https://www.teachithistory.co.uk/resources/ks4/medicine-ne-health/th>

3

<https://www.youtube.com/watch?v=HPe>

Historical Skill

Students will develop their knowledge and understanding of this period and practise how to answer questions that will target key features and causation and may also target other second order concepts (change, continuity, consequence, similarity, difference, significance).

Part 1 Medicine in Britain, c.1250-present

C1700-1900: Medicine in 18th and 19th Century Britain: Ideas about the causes of disease

"If you believe you can achieve!"

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, ideas about the causes of disease and illness during 18th and 19th century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **SPONTANEOUS GENERATION:** A theory that said that microbes were created by decaying matter (e.g. rotting animals or food). It seemed logical because scientists were able to see microbes through microscopes. *For further information click link 1.*
- **GERM THEORY:** was published by French scientist Louis Pasteur in 1861. He proved that spontaneous generation was wrong, and that germs in the air must cause decay.
 - Pasteur realised that if germs caused decay, then they might also cause disease. However, germ theory had almost no impact initially, for several reasons:
 - Spontaneous generation was still promoted by influential doctors.
 - Pasteur was not a doctor, and his work mainly looked at decay and spoiled food.
 - Doctors observed bacteria all over the body, even in healthy people, so it seemed impossible that they could cause disease.
 - Because Pasteur hadn't been able to identify the specific germs that caused different diseases, germ theory seemed to have little practical use in treating disease. *For further information click link 2*
- **Robert Koch,** a German scientist, was the first to identify the different microbes that caused disease. He discovered the bacteria that caused anthrax (1876), tuberculosis (1882) and cholera (1883). Koch made it easier for other scientists to study bacteria, because his method - growing bacteria in jelly, colouring them with dye and photographing them under the microscope - was used by others. Koch had a big advantage - he received funding from the German government. *or further information click link 3.*
- **MIASMA:** Despite new discoveries such as germ theory, many still believed in miasma until the late 1800s. London's sewage was emptied straight into the Thames, and this caused the Great Stink in 1858 which seemed to support miasma theory.

Glossary

Germs: micro-organisms that grow/germinate to cause disease

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.youtube.com/watch?v=Dlbh6024R1c>

2

<https://www.bbc.co.uk/bitesize/guides/ztpw4j6/revision/2>

3

<https://www.youtube.com/watch?v=ZmaoHB5fKB4&list=PLJIGpHXYzYnauWk5VrschC4vi30IIAVaf8&index=>

Historical Skills

Students will develop skills in assessing how far they agree or disagree with a statement about a person or event's importance by selecting relevant evidence, explaining its key features and arguing for and/or against the statement, evaluating and analysing the evidence to come to an overall justified judgement.

C1700-1900: Medicine in 18th & 19th Century Britain: Approaches to prevention & treatment1

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, the approaches to prevention and treatment of disease and illness during 18th and 19th century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

HOSPITALS: By 1700 there were only 5 in England. Hospitals focused more on treating people. Doctors visited patients regularly and apothecaries mixed treatments on site. Working-class people now had access to trained doctors. However, hospitals became less sanitary (less clean). There were separate wards for infectious patients, but doctors would often go between wards and patients without washing or changing clothes.

•**Florence Nightingale** helped to transform hospital care in Britain after her experience in the Crimean War in 1854. Nightingale was an effective organiser and administrator. She focused on thoroughly cleaning the hospital, providing clean clothes and bedding, improving sanitation and providing good ventilation (she believed in Miasma). The death rate at Scutari fell from 40% to 2%. Nightingale wrote books about her methods and founded the Nightingale School for Nurses in 1860. *For further information, click link 1.*

SURGERY: There were 3 problems: bleeding, pain and infection.

•**Anaesthetics** (Pain): Ether had been used as an anaesthetic in US, but it made patients vomit and cough. In 1847, James Simpson discovered Chloroform. However, there were some problems: An overdose could kill the patient; It sometimes affected the heart; With such an effective anaesthetic, doctors began to attempt more complex operations but patients died from blood loss and infection. *For more information click link 3.*

•**Antiseptics** (Infection): Patients would survive operations but die from infections like gangrene and sepsis. Joseph Lister believed germ theory and used carbolic acid (an antiseptic) to keep a wound clean in 1865. Lister also sprayed the acid during operations, to disinfect the air in the theatre. However, antiseptics were slow to catch on because: Germ Theory not widely accepted yet and Carbolic spray made surgeon's hand sore. However, by 1900, aseptic surgery was commonplace. *For further information click link 2 and 3.*

Glossary

aseptic surgery: removing all germs from operating theatres before surgery

Anaesthetics: A chemical that would send the patient to sleep for pain free surgery

Antiseptic: chemical that would clean germs to prevent infection.

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

[https://
www.bb
c.co.uk/b
itesize/g
uides/z2
7nqhv/re
vision/3](https://www.bbc.co.uk/bitesize/guides/z27nqhv/revision/3)

2

[https://
www.yo
tube.co
m/watch
?v=C8W
brS005F
F](https://www.youtube.com/watch?v=C8WbrS005FF)

3

[https://ww
w.youtube.
com/watch
?v=Vg1hqZ
anDa0&list
=PLIJGpHXY
zYnauWk5V
rschC4vi30L
IAYaf&inde](https://www.youtube.com/watch?v=Vg1hqZanDa0&list=PLIJGpHXYzYnauWk5VrschC4vi30LIAYaf&index=1)

Historical Skill

Students will develop their knowledge and understanding of this period and practise how to answer questions that will target key features and causation and may also target other second order concepts (change, continuity, consequence, similarity, difference, significance).

C1700-1900: Medicine in 18th & 19th Century Britain: Approaches to prevention & treatment2

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, the approaches to prevention and treatment of disease and illness during 18th and 19th century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **INOCULATION:** Smallpox was a major killer disease. Inoculation involved spreading pus from a smallpox scab into a cut in a healthy person and hopefully they would only catch a mild case of smallpox and become resistant to it. Some still died or passed the disease on.
- **THE DEVELOPMENT OF VACCINATIONS:** In 1796 Edward Jenner made a discovery that the mild illness cowpox could be used to vaccinate and prevent catching the deadly smallpox. However, there was opposition as he could not explain why it worked (see case study for more details). In 1852 smallpox vaccination was made compulsory, though it wasn't properly enforced until 1872. Louis Pasteur developed the next vaccines, for chicken cholera, anthrax and rabies, in the 1870s. He published his germ theory of infection in 1878. Pasteur, in turn, inspired Emil von Behring to develop vaccines for tetanus and diphtheria in 1890. *For further information click link 1.*
- **PUBLIC HEALTH:** Before the 1800s, the government had a laissez-faire ("leave alone") attitude towards public health. In 1842, Edwin Chadwick published his Report on the Sanitary Conditions of the Labouring Classes. It showed that poor people in cities had a much lower life expectancy. Chadwick suggested that local governments should be responsible for public health. The First Public Health Act (1848): encouraged local councils to set up a local board of health and provide clean water supplies. However, most councils didn't act because it was not compulsory. From the 1860s, the government began to take more action. Following the Great Stink of 1858, a modern sewer system was built in London. The Second Public Health Act (1875): It was compulsory for city authorities to: Provide clean water, Dispose of sewage safely, build public toilets, employ a public health officer to monitor disease, etc. *For further information click link 2*

Glossary

Vaccination: To be given a 'safe' substance to build up the body's immunity to a disease.

Inoculation: To be given a potentially 'unsafe' amount of a disease (e.g. smallpox scab rubbed into a cut) in the hope that it will only give a mild case of the disease so that immunity can be achieved.

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.youtube.com/watch?v=yqUFy-t4MIQ>

2

<https://www.bbc.co.uk/bitesize/guides/zq9s6fr/revision/sion/5>

Historical Skills

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Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1700-1900: Medicine in 18th and 19th Century Britain: Case studies

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, the discoveries of Snow and Jenner during 18th and 19th century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

EDWARD JENNER: Discovery: In the 1790s, Edward Jenner noticed that dairy maids who had already had the mild illness cowpox did not catch smallpox.

Jenner experimented by infecting a boy with cowpox, then waiting a few weeks and then giving him smallpox. The boy didn't catch smallpox. Jenner called this process vaccination (vacca = Latin for cow). Vaccination was safer than inoculation as it was a controlled dose, and the vaccinated person couldn't spread the disease. He published his theory in 1798. **Opposition:** However, Jenner's discovery was a one-off – he couldn't explain exactly why it worked, so he couldn't use it to prevent other diseases. Many did not believe him. The Royal Society refused to publish his ideas. Those who made a living from Inoculation were unhappy because vaccination lost them money. The Church felt that using animal infection in human trials was unnatural. *For further information, click link 1.*

JON SNOW: Discovery: There was serious Cholera epidemic in 1854. John Snow thought it was spread by drinking dirty water. Snow created a map showing all the cholera deaths in the area. The deaths seemed to be centred around the Broad Street water pump. He removed the handle of the pump so that people couldn't use it, and the deaths stopped. This proved that the pump caused the disease. It was later found that the pump had been contaminated by a nearby leaky cesspit. Snow presented his findings to Parliament in 1855. **Opposition:** Many rejected John Snow's work because he had no scientific proof. Overall, Snow had an immediate impact on the Broad Street area, but his impact outside of this area was limited. The importance of clean water was not truly accepted until later when Snow's ideas were backed up by Pasteur's germ theory in 1861 – but Snow was dead by this time. *For further information click link 2 & 3*

Glossary

Smallpox: A killer disease causing fever and pustules that left permanent scars on survivors.

Cholera: A killer water-born disease causing sickness and diarrhoea.

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.youtube.com/watch?v=sJRJeOxX6no>

2

http://www.bbc.co.uk/history/historic_figures/snow_john.shtml

3

<https://www.youtube.com/watch?v=TT4Z1Ikf36w&list=PLJIGpHXyZynauWk5VrschC4vi30IIAVgf&index=15>

Historical Skills

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Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1900-present: Medicine in 20th & 21st Century Britain: ideas about the causes of disease

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, people's ideas about the causes of disease and illness during 20th and 21st century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **Genetics** : some people are born with illnesses or conditions which were hereditary. By 1900, German scientist, Mendel believed that genes came in pairs, but microscopes weren't powerful enough to identify gene pairs. Scientists thought that a substance in human cells passed on information from each parent to their child. In 1953, Cambridge scientists James Watson and Francis Crick identified this substance as DNA. They found that DNA is shaped as a double helix after close-up x-ray images were produced by Rosalind Franklin and Maurice Wilkins. In 1990, scientists led by James Watson launched the Human Genome Project to identify the complete set of DNA which makes up human beings. It took 100s of scientists from 18 countries over 10 years to complete. Scientists now use this 'blueprint' to look for mistakes or mismatches in the DNA of people with hereditary diseases. *For further information, click link 1 and 2*
- **Lifestyle and health**: Smoking became more popular from the 1920s, especially amongst young people. Doctors now know that smoking can cause conditions such as cancer, high blood pressure, heart disease and tooth decay. People are now strongly advised not to smoke. Diet is also important. Sugar and fat should be eaten in moderation, because they can lead to diabetes and heart disease, and too much alcohol can damage the liver. Other lifestyle factors which influence health include unprotected sex, drug taking and tanning (can result in skin cancer).
- **Modern technology** means that doctors no longer have to use surgery to diagnose all diseases. Please see the table for some of the common technologies used to make a diagnosis: *For further information click link 3.*

Glossary

Hereditary: passed on from parents

Human Genome Project: set up to identify all 3 billion pairs of human DNA

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.teachithistory.co.uk/?resource=34930>

2

<https://www.youtube.com/watch?v=3dozVXh7hi8>

3

<https://www.bbc.co.uk/bitesize/guides/zchw4j6/revision/2>

Technology	First used	Used for
Blood pressure monitors	1880s	Diagnosing high and low blood pressure.
X-rays	1890s	Help to see inside the human body without surgery.
ECGs	1900s	Uses electrical impulses to track heart activity.
Endoscopes	1900s	A camera on the end of a thin, flexible tube, often used to investigate digestive symptoms.
Blood tests	1930s	Testing for conditions without the need for invasive surgery.
Ultrasound scans (sonograms)	1940s	Diagnosing things like gall and kidney stones, by using sound waves to create a picture.
Blood sugar monitoring	1960s	Allows diabetes sufferers to monitor blood sugar levels regularly.
CT scans	1970s	A more advanced form of x-rays, used to diagnose tumour and growths.
MRI scans	1970s	Diagnosing soft tissue injuries by using radio waves and magnets to create an internal image of the body.

Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1900-present: Medicine in 20th & 21st Century Britain: Approaches to prevention & treatment 1

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, approaches to prevention and treatment of disease and illness during 20th and 21st century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **The NHS:** Launched in 1948 to provide free medical care to everybody, paid for by everybody with National Insurance contributions. It was overseen by Minister of Health Aneurin Bevan after The Beveridge Report was published. The NHS took over existing hospitals and surgeries. The government made changes in the 1960s, including building more hospitals. Increased life expectancy and a larger population has resulted in longer waiting times and increasing costs. *For further information, click link 1.*
- **Magic bullets:** These were chemical cures which attacked disease causing microbes. Paul Ehrlich developed the first magic bullet in 1909. He tested arsenic compounds and found a cure for syphilis called Salvarsan 606 but it could also kill the patient. In 1932, Gerhard Domagk discovered that Prontosil cured blood poisoning in mice and then in humans after he used it on his ill daughter.
- **Antibiotics:** these were treatments that kill/limits the growth of bacteria in the body. The first antibiotic was penicillin. This was discovered by Fleming, Florey and Chain (see case study). Scientists have since been able to develop versions of penicillin to treat specific diseases. However, some penicillin-resistant bacteria has appeared. *For further information, click link 2.*
- **Modern drugs:** Scientists have developed medicines which treat specific diseases. Drugs trials now take several years - this slows progress but makes them safer. Mass production, the development of capsule tablets and the hypodermic needle have all made drugs more easily available.
- **Surgery:** Blood transfusions were possible after Karl Landsteiner identified the first blood groups in 1900. Blood banks were first used in the First World War. Successful organ transplants were first carried out in the 20th century, including the first kidney (1956), lung (1963), liver (1967) and heart (1967) transplants using keyhole surgery and robotic surgery. Since the 1930s, anaesthetics have been injected rather than inhaled to be safer. *For further information click link 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.teachmeanthistory.co.uk/resource/s/ks4/medicine-1>

2

<https://app.senecalearning.com/course/67b0ecb0-38be-11e8-977a-0db134efd493/section/1>

3

<https://www.bbc.co.uk/bitesize/guides/zchw4j6/revision/>

Historical Skills

Students will develop skills in assessing how far they agree or disagree with an statement about a person or event's importance by selecting relevant evidence, explaining it's key features and arguing for and/or against the statement, evaluating and analysing the evidence to come to an overall justified judgement.

Glossary

Anti-biotics: treatment to kill/limit growth of bacteria using microorganisms

Magic Bullet: Treatment to kill disease causing microbes using chemicals

Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1900-present: Medicine in 20th & 21st Century Britain: Approaches to prevention & treatment 2

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, approaches to prevention and treatment of disease and illness during 20th and 21st century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

Mass vaccinations: The first government vaccination campaign was for diphtheria in 1942. This was introduced because it was feared the cramped conditions in air-raid shelters during the war could lead to an epidemic. As a result, diphtheria cases plummeted. Another significant vaccination was for polio in the 1950s. Take-up for the vaccination was slow at first, until England footballer Jeff Hall died of polio in 1959. Because he was young, fit and famous, it showed that anyone could die from the disease. Demand became so high that extra supplies had to be flown in from America. *For further information, click link 1..*

Government legislation: The Liberal government of 1906-14 passed a series of social reforms to improving public health, including free school meals (1906), medical checks in schools (1907) and the National Insurance Act (1911), which gave assistance to ill workers. These measures went some way to improving access to medical care, although there were still many who couldn't afford to see a doctor.

Some other laws passed by government to make the country healthier are: The Clean Air Acts of 1956 and 1968, introduced after bad episodes of smog in London, dietary information must be displayed on food packaging, in 2007, smoking was made illegal in all enclosed workplaces, cigarettes cannot be advertised, and their packaging must be plain. *For further information, click link 2.*

Government lifestyle campaigns: As well as direct legal intervention, the government also tries to prevent disease through promoting a healthier lifestyle: Advertising campaigns, which warn about the dangers of smoking, drugs, alcohol and unprotected sex, events such as Stoptober, which encourages people to stop smoking and initiatives which encourage healthier eating, e.g. Change4Life. *For further information click link 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.bbc.co.uk/bitesize/guides/zch/w4j6/revision/5>

2

https://www.youtube.com/watch?time_continue=81&v=my14ZuzjH5I&feature

3

<https://www.bbc.co.uk/bitesize/guides/z99/24qt/revision/5>

Historical Skills

Students will develop skills in assessing how far they agree or disagree with an statement about a person or event's importance by selecting relevant evidence, explaining it's key features and arguing for and/or against the statement, evaluating and analysing the evidence to come to an overall justified judgement.

Glossary

Diphtheria: A contagious bacterial disease which hinders breathing and swallowing, and potentially fatal heart and nerve damage by a bacterial toxin in the blood

Polio: An infectious disease of the nerves of the spine that can cause paralysis

Part 1 Medicine in Britain, c.1250-present

"If you believe you can achieve!"

C1900-present: Medicine in 20th & 21st Century Britain: Case studies

The intended purpose of this unit of study is to develop pupils' knowledge and understanding of Medicine in England c.1250-present day, in particular, the work of Fleming, Florey and Chain in the development of antibiotics and the diagnosis, treatment and prevention of Lung Cancer during 20th and 21st century Britain. Furthermore, pupils will have the opportunity to develop the following historical skills; explaining and analysing reasons, explaining key features and comparing and evaluating the significance of events and people.

Pupils should know:

- **The development of Antibiotics:** British doctor Alexander Fleming discovered penicillin by chance in 1928. Penicillin spores landed on a petri dish of bacteria and the penicillin mould killed off the harmful bacteria. However, Fleming did not pursue it. In 1940, Howard Florey and Ernst Chain found that penicillin killed bacteria in infected mice, but it took a long time for them to grow penicillin. By 1941 they thought they had enough and experimented on a policeman with septicaemia. It seemed to work until they ran out and the patient died. Florey and Chain needed to produce it on an industrial scale, but British companies were busy with the war. In 1941 some American firms agreed to start production and the US government gave funding to 21 companies. In 1943, British companies also started to make penicillin. In 1944, there was enough penicillin to treat all the Allied soldiers wounded in D-Day. *For further information, click link 1 and 3.*
- **Lung Cancer** is the UK's 2nd most common cancer due to smoking. *Diagnosing lung cancer:* It was diagnosed using x-rays, but these were inaccurate. New technology has made diagnosis easier and more reliable: CT scans give a detailed image of inside the body, patients are injected with a dye to make the lungs show up on the scan, a bronchoscope (like an endoscope) is put into the lungs to collect a sample of the cells for testing. *Treating lung cancer:* There are many treatments available using modern technology: Removing all or part of the lung, lung transplant, radiotherapy, chemotherapy and investigations into genetic treatment. *Preventing lung cancer:* In 1985, the government got £4bn from tobacco tax so did not act. Since then, the government has taken action: In 2005, cigarette advertising was banned, in 2007, smoking was banned in public, the legal age to buy tobacco was raised to 18, in 2015, smoking was banned in cars carrying children, all cigarette products must be removed from display in shops, anti-smoking advertising campaigns are produced, the dangers of smoking taught in schools and the increased taxation of tobacco products, to make them more expensive. *For further information click link 2 & 3.*

Opportunities for deeper learning can be accessed by scanning or clicking the following links for topic-specific websites or YouTube clips:

1

<https://www.bbc.co.uk/bitesize/guides/zchww4j6/revisions/5>

2

<http://www.walto.ac.org.uk/wp-content/uploads/2015/07/12>

3

<https://www.youtube.com/watch?v=bF6gMaCIR9g>

Historical Skills

Describing key features of the past involves identifying relevant features of that aspect of the past and developing a description of them with precise factual information and then comparing them to another time period and carrying out the same detail about how that time period did things similarly or differently.

Glossary

Radiotherapy: shrinking the tumour with radiation
Chemotherapy: shrinking the tumour with drugs

GEOGRAPHY

Glossary

Gross national income per person (GNI)

The average income in a country it is also known as GNP gross national product.

PPP

Purchasing power parity a way of comparing the average wealth of a country by taking the cost of living into account

HIC

High income country eg UK

LIC

Low income country eg Malawi

NiC

Newly industrialised country eg India

Multinational companies (MNC's)

Large businesses such as Nike who have branches in several countries. Can also be known as Transnational companies

Infant Mortality Rate

The number of children who die before the age of 1 per 1000 that are born

Globalisation

Flows of people ideas money and goods are making and increasingly complex global web that links people and places from distant continents together.

Out sourcing

To get a product or service from a supplier that is outside the company .

Multiplier Effect

An upwards spiral of the economy and its benefits on employment. Positive multipliers are often triggered by large investment.

Tariff

A type of tax that might be charged on goods as they enter a country

Trade Blocs

Trading partnerships between different countries. The EU is an example.

Imports

The purchase of goods from another country

Subsidy

A payment that a country makes to its own farmer and businesses so their goods can be sold at a lower price to consumers

Fairtrade

A scheme to ensure farmers in LIC receive a fair and consistent price for their goods

Tourist Enclave

A tourist resort separated from the local community

Ecotourism

Small scale tourism which creates money for conservation and local jobs

Worlds countries by GNI

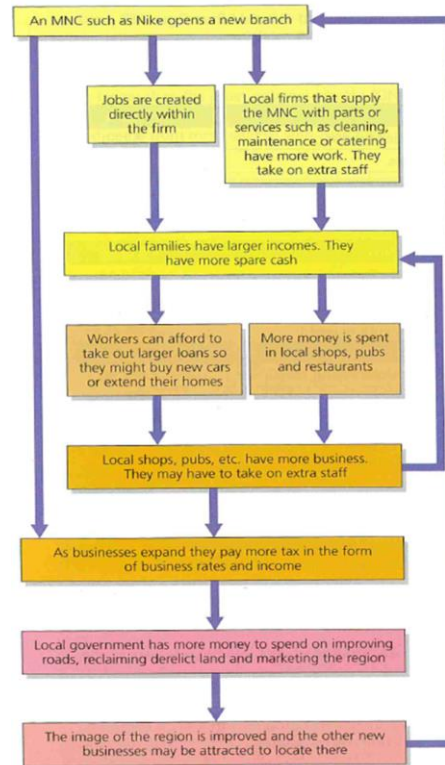


Positive multiplier effect



"Dear George, here we are in the middle of things having a great time. We feel we're really getting to know this exotic country. . ."

▲ Figure 40 Enclave tourism.



Year 11 Half Term 2: Development and resource issues water resources and regional economic development

"If you believe you can achieve!"

Glossary:

Abstraction

When water is taken from a river reservoir or underground source to be used it is abstracted

Over abstraction

When water is abstracted at a faster rate than it is recharged, leading to a store of water decreasing in size.

Water footprint

The amount of water used to make an item of food or make a product such as an item of clothing

Water Security

When society has enough water to ensure that everyone has clean water sanitation and good health and the economy has enough water to grow food and make things

Water Insecurity

When a country does not have enough water this is normally down to a lack of investment by the Government

Aquifers

Rocks in the ground that are capable of holding large quantities of water.

Top down development

When decisions about development are made by governments or officials rather than by ordinary people

Self Help scheme

Improvement projects carried out by ordinary people rather than by businesses or Government

Informal Sector

Section of the economy that includes many types of irregular jobs as well as jobs such as household chores child care and studying

Water Transfer

Movement of water from an area that has surplus to an area that requires it

Lesotho Highlands Water Project (LHWP)

An example of a large scale water transfer scheme

Hydro Electric Power (HEP)

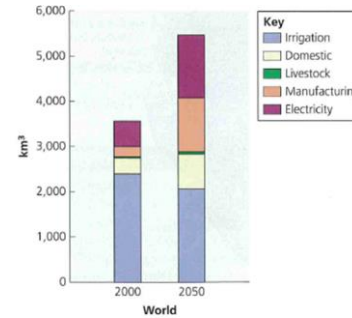
Using the power of water to create electricity usually by the construction of a dam.

Rainwater harvesting

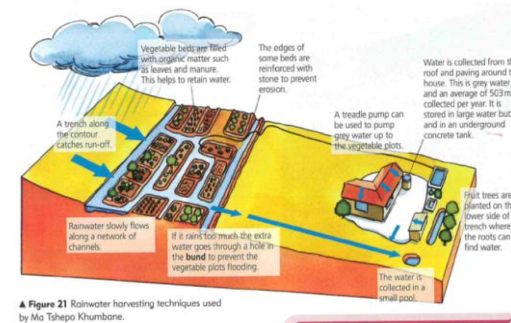
The collection and storage of rain water

Regional Inequalities

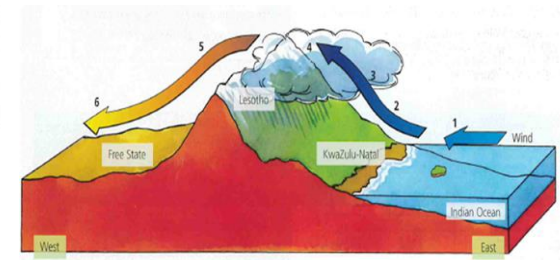
The uneven distribution of income or other variable across different locations



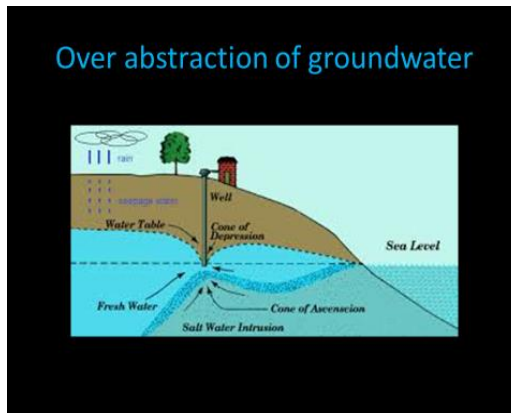
▲ Figure 9 Global water demand in 2000 and 2050.



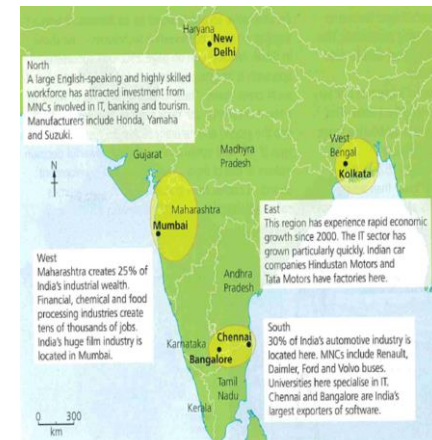
▲ Figure 21 Rainwater harvesting techniques used by Mo Tshepo Khumane.



▲ Figure 15 Relief rainfall patterns in South Africa and Lesotho.



▲ Figure 21 Over abstraction of groundwater



▲ Figure 1 India has four regions that are experiencing industrialisation.

SPANISH

Grammar

G Opinion verbs

Page 222

Interesar works like **gustar** and **encantar**.
It uses a pronoun like **me** or **te**.

Me interesa el dibujo. Art interests **me**.
¿Te interesan los idiomas? Do languages interest **you**?

Odiar and **preferir** don't need a pronoun.
Remember to use the definite article (el/la/los/las) when giving opinions about nouns.

G Adjectival endings for colours

Remember to make colour adjectives agree with the noun.

ending	singular		plural	
	masculine	feminine	masculine	feminine
-o	blanc o	blanc a	blanc os	blanc as
-e	verd e	verd e	verd es	verd es
consonant	azul	azul	azul es	azul es

Naranja, rosa and **violeta** often do not change, but some people add an -s with plural nouns.

A colour followed by **claro** (light) and **oscuro** (dark) always takes the masculine form:

unos calcetines azul claro, unas medias azul oscuro

G Desde hace

To say how long you've been doing something use **desde hace** and the present tense of the verb.

¿Desde hace cuánto tiempo tocas el piano?
How long have you been playing the piano?
Toco el piano **desde hace** seis años.
I have been playing the piano for six years.

¿Te interesa(n)...?

el arte dramático
el dibujo
el español
el inglés
la biología
la educación física
la física
la geografía
la historia
la informática
la lengua
la química
la religión
la tecnología
los idiomas
las empresariales
las matemáticas
las ciencias
la materia / la asignatura
me encanta(n) / me chifla(n)

Are you interested in...?

drama
art / drawing
Spanish
English
biology
PE
physics
geography
history
ICT
language
chemistry
RE
technology
languages
business studies
maths
science
subject
I love

me interesa(n) / me fascina(n)
me gusta(n) / no me gusta(n)
odio
prefiero
porque es / son
Mi día preferido es (el viernes).
mi horario
¿Qué día tienes...?
Tengo inglés los martes.
¿A qué hora tienes...?
a la una / a las dos
y / menos cuarto
y / menos cinco
y media
la educación infantil / primaria
la educación secundaria
el bachillerato
la formación profesional
el instituto

I'm interested in / fascinated by
I like / I don't like
I hate
I prefer
because it is / they are
My favourite day is (Friday).
my timetable
What day do you have...?
I have English on Tuesdays.
What time do you have...?
at one o'clock / at two o'clock
quarter past / to
five past / to
half past
pre-school / primary education
secondary education
A levels
vocational training
secondary school

¿Qué tal los estudios?

La física es más / menos ... que...
Es mejor / peor que...
tan ... como
fácil / difícil
divertido/a / aburrido/a
útil / relevante / práctico/a
creativo/a / relajante
exacto/a / lógico/a / exigente
Mi profesor(a) (de ciencias) es...
paciente / impaciente
tolerante / severo/a
listo/a / tonto/a
trabajador(a) / perezoso/a

How are your studies?

Physics is more / less ... than...
It's better / worse than...
as ... as
easy / difficult
fun / boring
useful / relevant / practical
creative / relaxing
precise / logical / demanding
My (science) teacher is...
patient / impatient
tolerant / harsh
clever / stupid
hard-working / lazy

simpático/a / estricto/a
Mi profe...
enseña / explica bien
tiene buen sentido del humor
tiene expectativas altas
crea un buen ambiente de trabajo
nunca se enfada
me hace pensar
nos da consejos / estrategias
nos pone muchos deberes
el curso académico
las pruebas / las evaluaciones
suspender / aprobar

nice / strict
My teacher...
teaches / explains well
has a good sense of humour
has high expectations
creates a good working atmosphere
never gets angry
makes me think
gives us advice / strategies
gives us lots of homework
academic year
tests / assessments
to fail / to pass

¿Cómo es tu insti?

En mi instituto hay... /
Mi instituto tiene...
un salón de actos
un comedor
un campo de fútbol
un patio
un gimnasio
una piscina
una biblioteca
una pista de tenis / atletismo
unos laboratorios
muchas aulas
Lo bueno / malo es que...
Lo mejor / peor es que...
Lo que más me gusta es / son ...
Lo que menos me gusta es / son ...
no...ningún / ninguna
ni...ni...
nada
nadie
tampoco
Mi insti es...
mixto / femenino / masculino

What is your school like?

In my school there is... /
My school has...
a hall
a canteen
a football pitch
a playground
a gym
a pool
a library
a tennis court / an athletics track
some laboratories
lots of classrooms
The good / bad thing is that...
The best / worst thing is that...
What I like most is / are...
What I like least is / are...
not a single...
(n)either...(n)or
nothing / anything
no-one / anyone
not either
My school is...
mixed / all girls / all boys

público / privado
pequeño / grande
moderno / antiguo
En mi escuela primaria había...
Mi escuela primaria tenía...
más / menos...
exámenes / deberes / alumnos
muebles / espacios verdes
tiempo libre
oportunidades / instalaciones
pizarras interactivas / clases
aulas de informática
donde jugar
poco espacio
antes / ahora
El edificio / El colegio /
El día escolar
es / era...
(in)adecuado/a / corto/a /
largo/a
Las clases son / eran...
Instituto de Educación
Secundaria (IES)

state / private
small / large
modern / old
In my primary school there was/were...
My primary school had...
more / fewer, less
exams / homework / pupils
furniture / green spaces
free time
opportunities / facilities
interactive whiteboards / lessons
ICT rooms
somewhere to play
little space
before / now
The building / The school /
The school day
is / was...
(in)adequate / short /
long
The lessons are / were
secondary school

Grammar

G Comparatives and superlatives

Comparatives

<i>más... que</i>	more... than
<i>menos... que</i>	less... than
<i>mejor que...</i>	better than...
<i>peor que...</i>	worse than...
<i>tan... como...</i>	as... as...

El español es **más fácil que** el mandarín.
La informática es **tan creativa como** la tecnología.

Superlatives

<i>el/la más...</i>	the most...
<i>el/la menos...</i>	the least...
<i>el/la mejor...</i>	the best...
<i>el/la peor...</i>	the worst...

Mi profesora de inglés es **la más divertida**.
El español es la asignatura **más interesante**.

G Negatives

These negatives are often used after the verb as a 'sandwich' with **no** before the verb.

No hago nada .	I don't do anything .
No conozco a nadie .	I don't know anyone .
No tenemos ni tabletas ni ordenadores.	We don't have either tablets or computers.
No tiene ningún laboratorio.	It doesn't have a single laboratory.
No tiene ninguna pista de tenis.	It doesn't have a single tennis court.
Nunca can go before or after the verb. When after, use no in front of the verb as well.	
Nunca estudia.	He/She never studies.
No estudia nunca .	He/She never studies.
Tampoco (not either) usually goes in front of the verb.	
Tampoco hay piscina.	There isn't a swimming pool either .

G Verbs with an infinitive

To describe rules, use these structures followed by the **infinitive**:

<i>está prohibido</i>	it is forbidden to
<i>no se permite</i>	you are not allowed to
<i>no se debe</i>	you/one must not
<i>hay que</i>	it is necessary to
<i>tenemos que</i>	we have to
<i>No se permite</i> ser agresivo o grosero.	

Las normas del insti

Tengo que llevar ...
Tenemos que llevar ...
(No) Llevo ...
(No) Llevamos ...
Es obligatorio llevar
un jersey (de punto)
un vestido
una camisa

School rules

I have to wear ...
We have to wear ...
I (don't) wear ...
We (don't) wear ...
It's compulsory to wear
a (knitted) sweater
a dress
a shirt

una camiseta
una chaqueta (a rayas)
una chaqueta de punto
una corbata
una falda (a cuadros)
unos pantalones
unos calcetines
unos zapatos
unos vaqueros
unas medias

a T-shirt
a (striped) jacket
a cardigan
a tie
a (checked) skirt
trousers
socks
shoes
jeans
tights

amarillo/a
blanco/a
negro/a
rojo/a
morado/a / violeta
naranja
rosa
azul
verde
gris
marrón
oscuro / claro
a rayas / a cuadros
bonito / feo
cómodo / incómodo
anticuado / elegante / formal
El uniforme...

yellow
white
black
red
purple
orange
pink
blue
green
grey
brown
dark / light
striped / checked
pretty / ugly
comfortable / uncomfortable
old-fashioned / smart / formal
Uniform...
improves discipline
limits individuality
gives a positive image of the school
saves time in the morning
It is forbidden...
You are not allowed...
You / one must not...
to chew chewing gum
to use your phone in lessons
to damage the facilities
to be aggressive or rude
to run in the corridors

llevar piercings
Hay que...
ser puntual
respetar el turno de palabra
mantener limpio el patio
La norma más importante es...
respetar a los demás
Las normas son...
necesarias / demasiado severas
para fomentar la buena disciplina
para limitar la libertad de expresión
para fastidiar a los alumnos
sacar buenas / malas notas
Estoy de acuerdo.
¡Qué va!
¡Qué horror!
¡Qué bien!
Un problema de mi insti es...
el estrés de los exámenes
el acoso escolar
la presión del grupo
Hay (unos) alumnos que...
se burlan de otros
sufren intimidación
tienen miedo de...
hacen novillos
quieren ser parte de la pandilla
son una mala influencia

to have piercings
It is necessary...
to be on time
to wait for your turn to speak
to keep the playground clean
The most important rule is...
to respect others
The rules are...
necessary / too strict
for promoting good discipline
for limiting freedom of expression
for annoying the pupils
to get good / bad grades
I agree
No way!
How awful!
How great!
One problem in my school is...
exam stress
bullying
peer pressure
There are (some) pupils who...
make fun of others
are victims of intimidation
are afraid of...
skive
want to be part of the friendship group
are a bad influence

Grammar

G The near future

Page 216

Use the **near future tense** to say what you are going to do. Use the present tense of **ir** + **a** + **infinitive**.

voy
vas
va
vamos a visitar
vais comer
van salir

G Asking questions

To form questions, follow the question word with the verb.

Vamos a llegar a las dos. We are going to arrive at two.

¿Cuándo vamos a llegar? When are we going to arrive?

Simply start 'Yes/No' questions with the verb.

¿Llevas uniforme? Do you wear a uniform?

Remember to use an inverted question mark at the start, and a 'tilde' on each question word.

G Direct object pronouns

Page 228

Direct object pronouns replace the **noun** which has just been mentioned and avoid repetition.

The pronoun agrees with the noun it replaces:

	masculine	feminine
singular	lo	la
plural	los	las

It usually goes before the verb:

Toco **el saxofón**. **Lo** toco.

I play **the saxophone**. I play **it**.

Participé en **una competición**. **La** gané.

I took part in **a competition**. I won **it**.

With the near future tense, the direct object pronoun can go either at the end of the infinitive or before the present tense of **ir**:

Voy a **hacerlos**. I am going to do **them**.

Los voy a **hacer**. I am going to do **them**.

The pattern is the same for other verb + infinitive structures:

Puedo **hacerlo**. I can do **it**.

Lo puedo **hacer**. I can do **it**.

¿Cómo es tu día escolar?

normalmente
Salgo de casa a las...
Voy...
a pie / andando
en bici / en autobús / en coche
en metro / en taxi / en tren

What is your school day like?

usually
I leave home at...
I go...
on foot / walking
by bike / by bus / by car
by underground / by taxi / by train

Las clases empiezan / terminan a las...
Tenemos ... clases al día.
Cada clase dura ... minutos
El recreo / La hora de comer... es a la(s)...

Lessons start / finish at ...
We have ... lessons per day.
Each lesson lasts ... minutes.
Break / Lunch is at...

¿Qué vas a hacer?

Voy / Vas / Vamos a...

llegar / salir / estar
ir en coche / andando
llevar ropa de calle
ir / comer juntos
hacer una visita guiada
ver los edificios

What are you going to do?

I'm going / You're going / We're going to...
arrive / go out / be
go by car / walk
wear casual clothes / non-uniform
go / eat together
do a guided tour
see the buildings

pasar todo el día en...
asistir a clases
practicar el español
ir de excursión
tener una programación variada
Va a...
ser fácil / guay

spend the whole day in...
attend lessons
practise Spanish
go on a trip
have a varied programme
It's going to...
be easy / cool

Las actividades extraescolares

Toco la trompeta...
Canto en el coro...
Voy al club de...
Soy miembro del club de...
ajedrez / judo / teatro / periodismo
lectores / Ecoescuela / fotografía
desde hace ... años / meses
Para mí...
Pienso que / Creo que...
las actividades extraescolares son...
muy divertidas
algo diferente / un éxito
te ayudan a...
olvidar las presiones del colegio
desarrollar tus talentos
hacer nuevos amigos
te dan...
una sensación de logro
más confianza
la oportunidad de ser creativo/a
la oportunidad de expresarte

Extra-curricular activities

I play / I've been playing the trumpet...
I sing / I've been singing in the choir...
I go / I've been going to the ... club
I am / I've been a member of the ... club
chess / judo / drama / reporters
reading / eco-schools / photography
for ... years / months
For me...
I think that...
extra-curricular activities are
a lot of fun
something different / an achievement
they help you to...
forget the pressures of school
develop your talents
make new friends
they give you...
a sense of achievement
more confidence
the opportunity to be creative
the opportunity to express yourself

El año / trimestre / verano pasado...
participé en un evento especial / un concierto / un concurso / un torneo
gané un trofeo
toqué un solo
conseguimos la clasificación como...
tuvimos una charla
ganamos una competición nacional
dimos un concierto
¡Fue un éxito!
Este trimestre / El próximo trimestre...
voy a
aprender a ...
continuar con...
dejarlo
apuntarme al club de...
vamos a...
montar una obra de teatro
conseguir...

Last year / term / summer...
I took part in a special event / a concert / a competition / a tournament
I won a trophy
I played a solo
we achieved the award / designation as...
we had a talk / presentation
we won a national competition
we gave a concert
It was a success!
This term / Next term
I'm going to...
learn to ...
continue with...
stop doing it
sign up for the ... club
we are going to...
put on a play
achieve...

PE GCSE

Glossary:

Short term effects of exercise-

Heart Rate- the number of times the heart beats per minute increases with exercise.

Breathing Rate- the number of breaths per minute increases with exercise.

Stroke volume- the amount of blood leaving the heart each beat increases with exercise.

Cardiac Output- $HR \times SV$ - the amount of blood leaving the heart per minute.

Recovery Rate- the time it takes for the heart rate to return to resting.



Climbing- equipment, rope management skills, belaying 1,2,3 devices, route planning traversing, finger/ foot holds .climbing techniques.



Road Cycling. Bike management, starts, cornering, accents, descents, sprints, positioning/ chain formations, group cycling. 10 mile race- Colne track



How to warm up and why!

Pulse raising activity- to increase blood flow to the working muscles.

Stretches- lower and upper body, preparing the body for physical activity

Skill drills- specific to the actual sport. Eg dribbling in football. Main game situation- usually small sided - putting the learned techniques into practice.

GCSE Sports- isolated skills (10marks) application 25 marks

Key Netball skills.- footwork, shooting, pivot, positioning, 3second rule , chest/ bounce pass, movement off the ball. Defensive / attacking strategies.

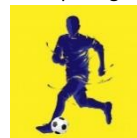
Dance- problem solving, steps, motif, gesture, canon, unison, transition, aesthetic performance of the routine.

Trampolining- shapes, twists, seat drop, swivel hips , roll, somersault, combination skills, front/ back drop, 10 bounce routines

Badminton- grip, serve, overhead clear, net shot , Forehand/ backhand drives/ smash



- **Football** – isolated skills – ball control, dribbling, passing, shooting, heading, goal keeping
- Application within the game- positioning, defensive/ attacking strategies , making space, decoy runs, tracking opponents. Imposing oneself on the game.



- Table Tennis- serves, back/ forehand push, drive. smash, net shot, defensive loop- application within a game situation.
- Other individual sports outside of our curriculum- Boxing, Rugby, Tennis, Lacrosse

Athletics.

Sprints- warm up drills, leg flicks, starts, drive phase, maintaining form, high knees, long strides dip finish.

• **Middle distance-** starts, establish a position, maintain form, monitor opponents, react and make a move, pace, kick finish

• **Throws-** grip, stance, footwork , approach, delivery, angle of trajectory, follow through.

• **Jumps-** mark out run up, Angle of approach, speed, take off, sink and lift, specific techniques (sail, hitch kick, fosbury flop) . . .



Glossary:

Cardiovascular system- consists of blood, blood vessels and the heart responsible for circulating blood around the body. Each time **the heart** beats it squeezes blood out to the blood vessels.

Blood- consists of **plasma**, **platelets**, **red and white blood cells** that are transported around the body.

Blood vessels- part of the vascular system that transports blood around the body.e.g arteries, veins and capillaries.

Vasodilation- **when the body temperature rises** the blood vessels under the skin increase in diameter to increase the blood flow to the capillaries allowing heat to radiate from the skin.

Vasoconstriction- **when the body temperature drops** the blood vessels under the skin decrease in diameter to decrease the blood flow to the capillaries so less heat is lost by radiation.

Carbon Dioxide- a gas which is produced as a by product during energy production. The CV system takes CO2 away from the muscles to get rid of it from the body.

Oxygenated blood- has high levels of oxygen in but low levels of CO2.

Deoxygenated blood has low levels of oxygen in but high levels of CO2.

Right atrium- top chamber of the heart that receives **deoxygenated** blood from the body via the **vena cava**.

Left atrium- top chamber of the heart that receives **oxygenated** blood from the lungs via the pulmonary vein.

Pulmonary- anything associated with the lungs.

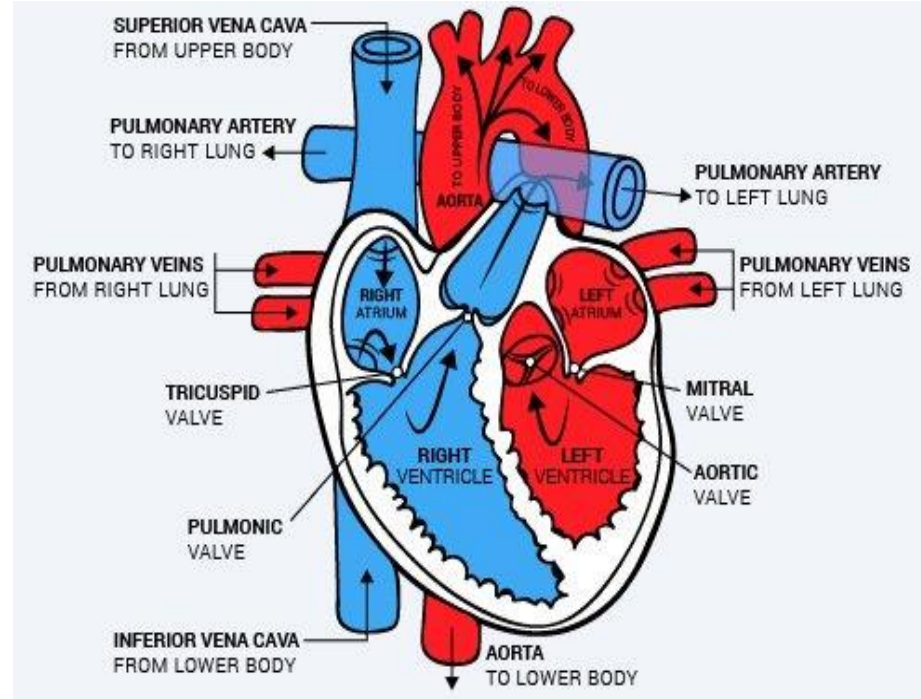
Right ventricle- bottom chamber of the heart that receives **deoxygenated** blood from the right atrium.

Left ventricle- bottom chamber of the heart that receives oxygenated blood from the left atrium via the bicuspid valve

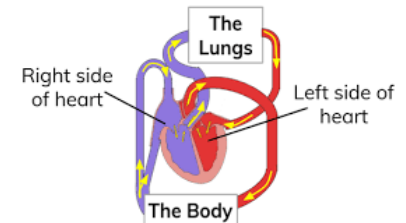
Septum- is the wall that separates the left and right sides of the heart

Valves- help keep the blood flowing forwards, they prevent the back flow of blood. Valves are generally in veins where the blood is under low pressure.

A cross section of the heart showing blood returning via the **vena cava** (main vein), its flow through the various chambers of the heart, collecting **oxygen** from the lungs then returning to the heart before being transported to the muscles and vital organs via the **aorta**.(main artery)



A simple diagram showing blood flow around the heart.



Glossary:

Tricuspid valve- is on the right side of the heart between the **right atrium** and **right ventricle**.

Bicuspid valve- is on the left side of the heart between the **left atrium** and **left ventricle**. Also known as the Mitral valve

Semilunar valves- are between the ventricles and the **pulmonary artery and vein**.

Vena cava- is the main vein bringing **deoxygenated** blood back to the heart so it can be pumped to the lungs to collect **oxygen**.

Aorta- is the main artery and carries **oxygenated blood away** from the **left ventricle** to take **oxygen** to the working muscles and vital organs.

Pulmonary artery- receives **deoxygenated blood** from the right ventricle to take to the **lungs** to receive **oxygen**.

Pulmonary Veins- bring oxygenated blood from the lungs to the left atrium.

Lumen- the internal diameter of an artery.

Heart rate- number of times the heart beats per minute

Stroke Volume- the amount of blood pumped out of the heart on one single contraction

Cardiac output- the volume of blood pumped out of the heart per minute.

Cardiac output = Stroke volume x HR

Blood vessels-

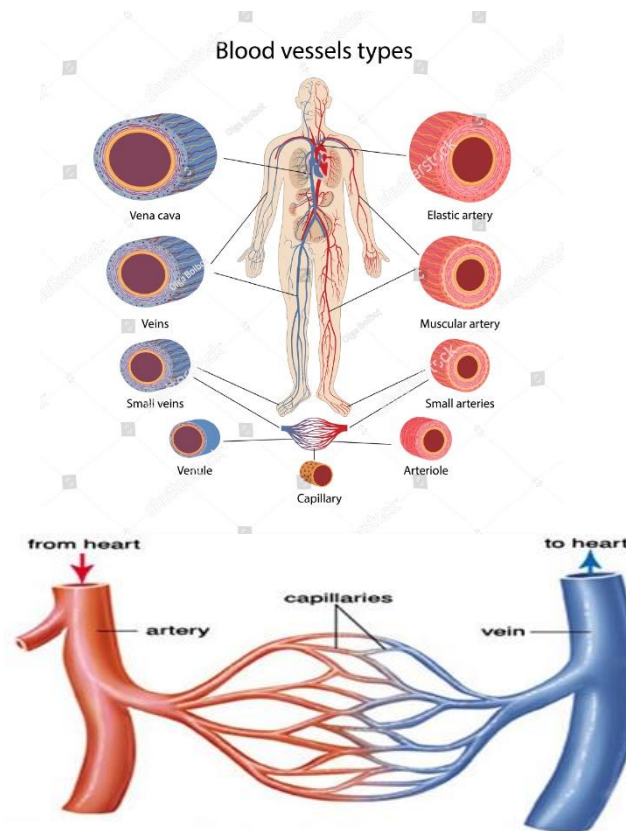
1. Arteries- thick muscular and elastic walls with a small internal diameter (lumen) Mainly carry oxygenated blood under high pressure. Carry blood **AWAY** from the heart

2. Veins- thin walls , contain valves with a large internal diameter (lumen).Carry blood at low pressure back to the heart. Mainly carries deoxygenated blood .**Except in the pulmonary veins** where oxygenated blood is carried from the lungs to the heart.

3. Capillaries- very thin walls(one cell thick) with a small internal diameter. Their function are to link smaller arteries with smaller veins. They carry blood under low pressure. where the gaseous exchange occurs- the thin walls allow nutrients and gases to pass through them, therefore getting oxygen to the muscles and removing carbon dioxide.

Functions of the Cardiovascular system.

- ✓ Transport oxygen (in red blood cells) and remove carbon dioxide
- ✓ To help clot blood on open wounds- platelets are contained within blood
- ✓ Transport nutrients (food particles) to the body in the blood
- ✓ regulate body temperature-
- ✓ Help the immune system (white blood cells fight infection.



How arteries are linked to veins via capillaries

Glossary:

Joint- is the place where two or more bones meet

Abduction- movement **away from** the centre line of the body

Adduction- movement **towards** the centre line of the body.

Axis of movement- an imaginary line that the body or body part can move around.

Circumduction- movement of a limb, hand or foot in a circular movement (360 degrees around the joint)

Dorsi- flexion- flexion at the ankle by lifting the toes.

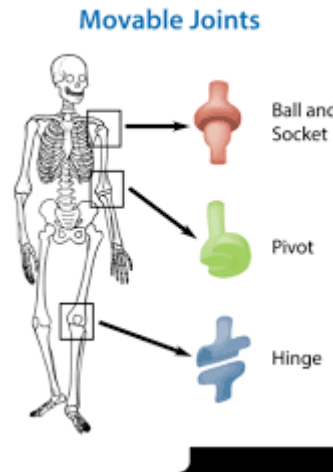
Extension- **opening** an angle at a joint e.g straightening the arm.

Flexion- **closing** an angle at a joint e.g-bending the arm

Plantar Flexion- extension at the

ankle by pointing the toes.

Rotation- movement of the body in a clockwise or anti clockwise motion. e.g full twist in trampolining.



Ball and socket joints.

Located – hip and shoulder

Movement possibilities.

- ✓ Flexion
- ✓ Extension
- ✓ Rotation
- ✓ Circumduction
- ✓ Abduction
- ✓ Adduction



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Hinge Joints.

Located at the knee elbow and ankle
Movement possibilities.

- ✓ Flexion
- ✓ Extension

Pivot joints

Located at the neck, elbow
Movement possibilities.

- ✓ Rotation

Condyloid joints

Located at the wrist
Movement possibilities

- ✓ Flexion
- ✓ Extension and circumduction

Flexion and **extension** can occur at ball and socket joints, hinge joints and condyloid joints.
the back leg is flexing on the back lift ready to extend on the follow through of the kick.



Circumduction- 360 circular movement
e.g butterfly swimming action.



Abduction- occurs when reaching out sideways to intercept a netball.

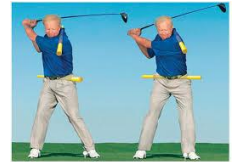


ADDUCTION: Sporting examples



A GYMNAST WILL ADDUCT THE ARMS AT THE SHOULDER WHEN LIFTING UP INTO THE CRUCIFIX POSITION DURING A RINGS ROUTINE

Rotation- allows for the biggest range of movement, when the bone at the joint moves around its own axis



Dorsi –flexion- occurs at the ankle. Movement of the foot upwards towards the shin occurs at the ankle of the athlete jumps the hurdle.



Plantar- flexion- movement of the foot downwards when you point your toes. E.g seat drop pointed toes.



Remember –Cartilage- acts as a cushion between bones to prevent damage during movement. **Ligaments** attach bone to bone and help stability. They are made with tough fibrous tissue.

Tendons- attach muscles to bones and allow bones to move when muscles contract.

Glossary:

Antagonistic pairs – muscles that create opposing movement at joints. When one muscle contracts the other relaxes.

Agonist- the muscle that contracts

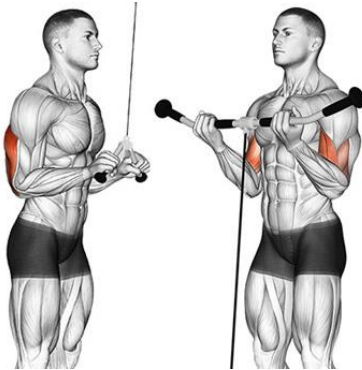
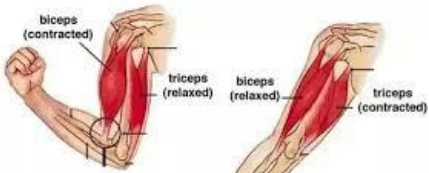
Antagonist- the muscle that relaxes.

Origin- and Insertion- attach the muscle to the bone. For movement to occur the insertion will always move towards the origin.

Muscle fibres – fibres running through the muscle itself. They fall into 3 main categories depending on their capabilities.

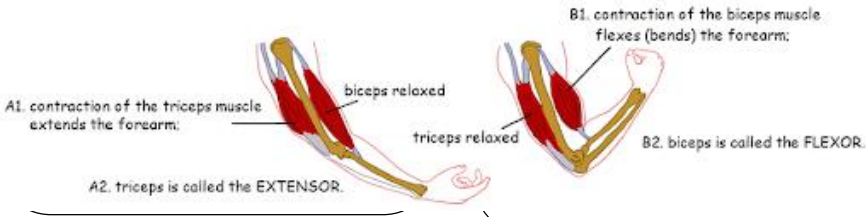
- 1. Slow Twitch- TYPE 1 (endurance)
 - 2. Fast Twitch- TYPE IIA(400m)
 - 3. Fast Twth- TYPE IIX (100m)
- Biceps and Triceps working together to create movement.

e.g Biceps curl in weights.

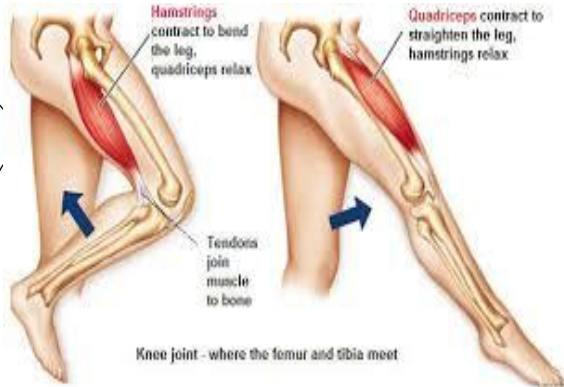


Antagonistic muscles

- * muscle PULLS when it contracts, but exerts no force when it relaxes and CANNOT PUSH:
- * one muscle PULLS the bone in one direction, another muscle PULLS the bone in the other direction;
- * muscles are called ANTAGONISTIC as the muscles have opposite functions;
- * e.g. biceps and triceps.



Antagonistic pairs- quadriceps and hamstrings working together to create movement.



Sporting example- kicking a football

Antagonistic pairs. gastrocnemius and tibialis anterior- eg. Pointing toes in pike jump in trampolining.



Antagonistic pairs . Hip Flexors and gluteus maximus– e.g hip flexion in diving, hip extension- slam dunk in basketball.



Muscle fibre types.

There is only one type of slow twitch fibre- **TYPE 1**

- ✓ Produce low force
- ✓ Slow speed of contraction
- ✓ High endurance
- ✓ Good for endurance activities e.g cross country running
- ✓ Do not produce much power.

Fast twitch type II a

Produces high force, moderate speed contraction, medium endurance. More resistant to fatigue than type 11 but not as powerful a contraction and less resistant to fatigue than type 1. e.g. 400m athletics

Fast twitch II x

Produce very high force, fast contracting. Low endurance.

Good for short explosive actions requiring power, strength, speed. E.g- 100m sprint. Only provide power for very short time- fatigues

Glossary:

Ligaments- tough connective tissue that joins bone together to form a joint.

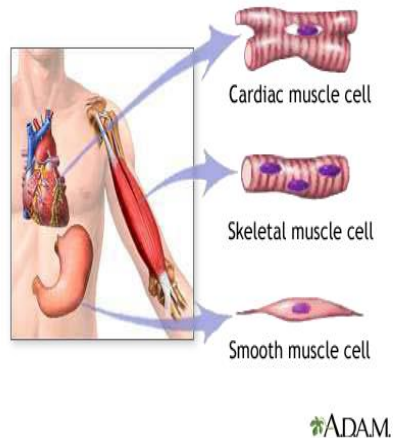
Tendons- tough connective tissue joins muscle to bone

Muscle types- there are 3 types of muscle. Each has a classification based on its characteristics.

1. **Cardiac muscle**
2. **Smooth muscle**
3. **Skeletal muscle**

Involuntary muscles- muscles we do not have direct control over-e.g the walls of the intestines and the cardiac muscle.

Voluntary muscles- muscles we do have control over e.g skeletal muscles such as the biceps.



ADAM

Role of ligaments

- Join bone to bone
- Keeps joints stable
- Prevents unwanted movement that may cause injury.

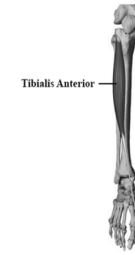
Role of Tendons

- Hold the muscle to bone so that when the muscle contracts the muscle can pull on the bone to create movement.



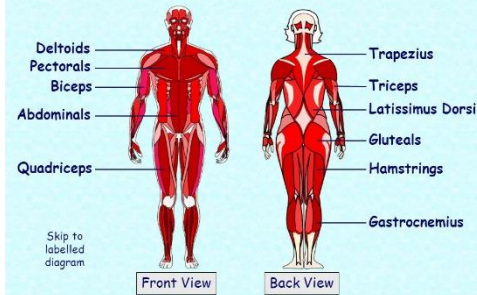
Tibialis anterior- front of the lower leg .role dorsi- flexion at the ankle .e.g bringing the toes up on the leading leg in hurdles.

Gastrocnemius- **plantar flexion at the ankle** e,g standing on tip toes (ballet)

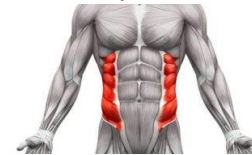


The Muscular System

These are the major muscles of the body...



External Obliques- between lower ribs and abdomen. Role- rotates the trunk and helps pull chest down when javelin throwing



Hip Flexors- very top of front of upper leg. **Flexion at the hip** when bringing the legs up in seat drop position. Lifting knee when sprinting.



Muscle function.

Biceps- **flexion** at the elbow e.g curling weights

Triceps- **extension** at the elbow e.g jump shot in basketball.

Pectoralis major- **adduction and flexion** at the shoulder e.g tennis forehand drive across body
Deltoid- **flexion,extension, adduction or circumduction at the shoulder** e.g front crawl swim

Gluteals **extension** of the leg at the hip. E.g sprinting lifting the leg back.

Latissimus dorsi - **extension,adduction, rotation at the shoulder** e.g butterfly arm action swimming .

Hamstrings- **flexion at the knee** e.g bending the leg back when kicking a football.

Quadriceps- **extension at the knee** e.g drop kick in rugby, hand stand with straight legs.

Paper 1 Topic 1 Anatomy and Physiology Skeletal System

Glossary:

Musculo-skeletal system-the combination of the muscular system and the skeletal system working together to allow movement.

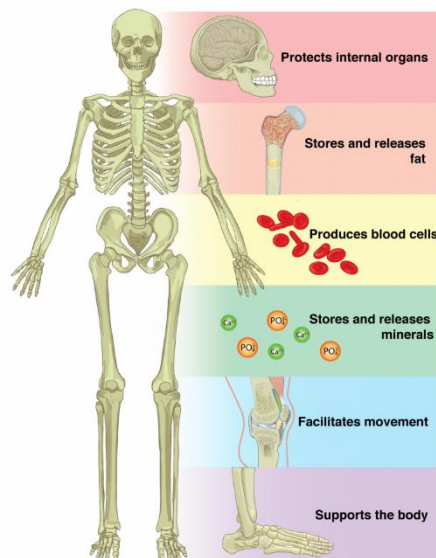
Platelets- blood cells that help clot blood

Red Blood Cells- cells that transport oxygen to the working organs and muscles.

White Blood Cells- cells that help fight infection

Mineral Storage- calcium and phosphorus are stored in bones to help strengthen them.

Protection- skeleton provides protection for your vital organs e. the ribs protect the heart and lungs, the skull protects the brain.



Functions of the skeleton

- ✓ Production of blood cells
- ✓ Storage of minerals
- ✓ Protection
- ✓ Provide muscle attachment
- ✓ Aid movement.

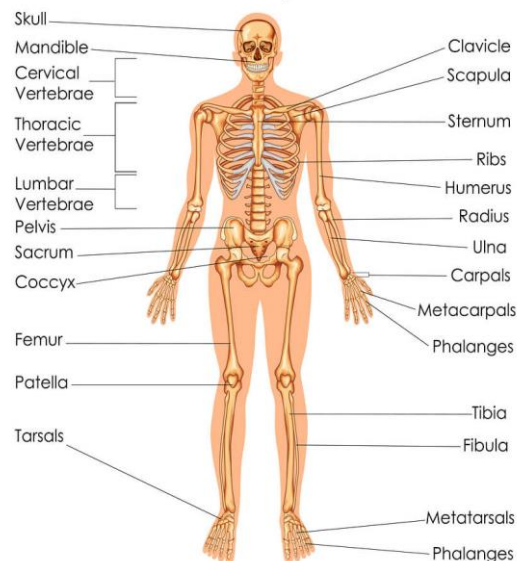


Classification of bones. Each bone type has a particular function.

- ✓ **Long bones** e.g- **femur** aids movement by working as levers.
- ✓ **Short bones**- e.g **carpals** are weight bearing and provide support.
- ✓ **Flat plate-like bones**- e.g **cranium** provide protection and muscle attachment.
- ✓ **Irregular bones**- e.g- **vertebrae column** provide protection, aid movement, allow muscles to attach.

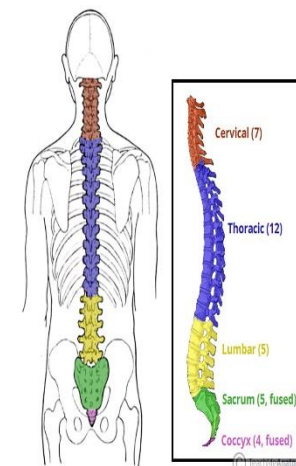


Skeletal System



Vertebral Column- very important for movement, protects the spinal cord and allows muscles to attach. It has 5 regions.

1. Cervical vertebrae
2. Thoracic vertebrae
3. Lumbar vertebrae
4. Sacrum
5. Coccyx



The Patella- (knee cap) - is a different type of bone- it's a sesamoid bone. It protects the tendon that crosses the knee joint by stopping it rubbing against the femur.

Glossary:

Aerobic respiration-when the body releases energy using glucose and oxygen . Carbon Dioxide and water are produced as by-products.

Anaerobic respiration- when the body doesn't have enough oxygen to release energy aerobically, so it just uses glucose. Lactic acid is produced as a by-product.

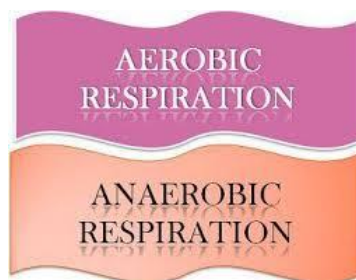
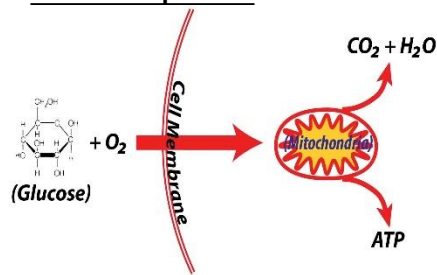
Lactic acid- a waste product produced during anaerobic respiration, making the muscles feel tired.(fatigued)

Carbohydrates-the bodies main source of fuel .They are used for aerobic activities at moderate intensity. (pasta, potatoes)and also high intensity anaerobic activities.

Fats- source of fuel for aerobic activity at low intensity . Fats

provide more energy than carbohydrates, but they can't be used as fuel for higher intensity activities.

Aerobic respiration



Aerobic respiration-

Glucose + O_2 = Energy + $CO_2 + H_2O$ + heat

Glucose from food and oxygen that is breathed in produces energy. The process produces carbon dioxide, water and heat in addition to energy.

Example activities- endurance events such as long distance rowing, swimming, cycling. Sports that take time with lower intensity.

Anaerobic respiration-

Glucose = lactic acid + energy

No oxygen just glucose (from food) produces energy and lactic acid. Lactic acid builds up in the muscles causing them to fatigue, cramp up and effect performance. Example activities- sports with higher intensity- 100m sprinting, shot put- over in a very short period of time.

Energy sources-

Fats- are energy source for aerobic activity

- ✓ Require oxygen to break down into glucose
- ✓ Are slow to break down
- ✓ Once broken down give large quantities of energy for exercise.

Carbohydrates- are an energy source for aerobic and anaerobic activity.

- ✓ Do not require oxygen to break down into glucose
- ✓ Do not give as much energy as fats
- ✓ Are quicker to break down and release more energy than fats.

Respiration- the process of energy production

Energy sources- the macronutrients that provide energy.

Short term effect on the muscular system.

When you start to exercise there is an increased demand for energy. This energy can be supplied through aerobic or anaerobic respiration.

Anaerobic respiration can lead to

1. **Muscle fatigue**- when the efficiency of the muscles drops, reducing performance level.
2. **Lactate accumulation**- a chemical formed through anaerobic respiration that builds up in the muscle tissue.

When you start to exercise the muscles require energy quickly. They use :

- the oxygen stores in the muscle (myoglobin)
- The haemoglobin in the blood.
- However there is still not enough oxygen to work for long. This results in oxygen debt.
- To repay this oxygen debt the performer has to lower the intensity or even stop exercising in order to deep breathe heavily.
- This :-
 1. replenishes myoglobin stores with oxygen
 2. Breaks down lactic acid into carbon dioxide and water.
 3. Allows energy stores in the muscles to be replenished.

Muscle fatigue occurs- when the muscle is not able to produce the energy it needs for level of activity, due to the increase in lactic acid in the muscle cells. The performer has to slow down or stop in order to allow the muscles time to recover.

Glossary:

Vascular Shunting- the redistribution of blood flow during exercise compared to rest.

Vasoconstriction- means that the blood vessels are constricted (squeezed) to make them smaller

Vasodilation- means that the blood vessels are dilated to make them bigger.

Plasma- liquid component of blood, it transports the blood cells, platelets and nutrients to different parts of the body.

Red blood cells- these blood cells carry oxygen and remove carbon dioxide.

White blood cells- fight against infection and bacteria. They help you stay healthy and perform.

Platelets- help clot the blood by sticking to each other and the walls of the blood vessels. If the performer gets cut the platelets form a plug to prevent further blood loss.



Four main components in blood.

1. Red blood cells-

- ✓ Carry oxygen
- ✓ This oxygen is diffused into the blood stream in the alveoli in the lungs
- ✓ The oxygen then binds with **Haemoglobin** in the red blood cells and is transported to the working muscles.

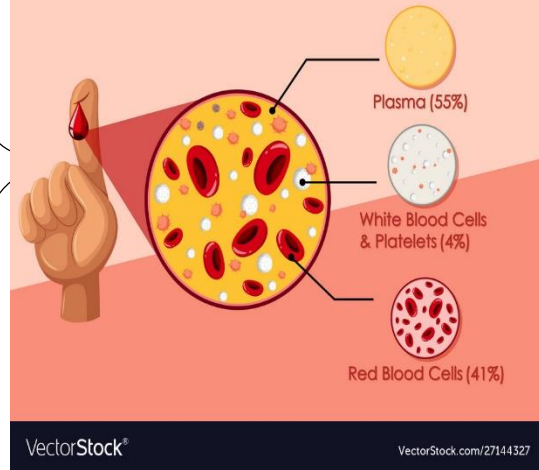
2. White blood cells-

Fight infection- performers need to stay healthy so they can perform and train at the highest level.

3. **Plasma** – carries everything in the blood stream. including blood cells, digested food(nutrients/ glucose), and waste carbon dioxide.

4. **Platelets-** help clot the blood to prevent further bleeding e.g boxing cut, astroturf burn.

COMPOSITION OF BLOOD



Why do we go red when exercising?

As your muscles work they generate heat, which warms the blood, this blood is then shunted closer to your skin, so the heat can escape through radiation. The muscle heat increases your core temperature so we sweat in order to cool our bodies down.

Your blood vessels change when they exercise.-

When you exercise, blood is redistributed around the body to increase the supply of oxygen to your muscles- this is known as **vascular shunting**.

1. When you exercise, your arteries widen to stop your blood pressure getting too high.-

2. blood that usually goes to the gut/ liver is shunted (re-directed) to the working muscles.-

3. The blood vessels in the muscles widen (vasodilation) to allow more blood to flow- this supplies the muscles with more oxygen from the red blood cells. This improves performance

4. The blood vessels in the inactive organs (gut /liver) narrow (vasoconstriction) to restrict the amount of blood that can flow in.

Blood Pressure- how strongly the blood presses against the walls of blood vessels.



Glossary:

Cardiovascular system- the organs responsible for circulating blood around the body.

Respiratory system- the organs in the body used for breathing.

Musculo-skeletal system- the combination of muscular and skeletal systems working together to allow movement.

Heart rate- (HR) the number of times the heart beats per minute.

Stroke volume- (SV) the amount of blood leaving the heart each beat.

Cardiac output- HR x SV- the amount of blood leaving the heart per minute.

Recovery rate- the time it takes for heart rate to return to resting rate.

Breathing rate- the number of breaths per minute.

Oxygen deficit- occurs when the

athletes intake of air is insufficient to supply the working muscles given the level of intensity he is working at.- leading to a build up of lactic acid in the muscles.



	Short Term Effects of Exercise	Long Term Effects of Training
Cardiovascular System	<ul style="list-style-type: none">Heart rate increasesIncreased stroke volumeIncreased cardiac outputBlood pressure increasesVascular shunting takes place	<ul style="list-style-type: none">Increased strength of heart muscleIncreased size of heartIncreased resting stroke volumeDrop in resting heart rateIncreased maximum cardiac outputIncreased capillarisationIncrease in number of red blood cellsQuicker recovery rate after exercise to return to resting heart rate
Respiratory System	<ul style="list-style-type: none">Increased breathing/ventilation ratesIncreased depth of breathingOxygen debt	<ul style="list-style-type: none">Increased strength of diaphragmIncreased strength of external intercostal musclesIncreased tidal volumeIncreased vital capacityIncreased number of alveoli

The Long Term Benefits of Exercise on the CV system

- drop in resting blood pressure
- reduction in cholesterol levels
- reduction in likelihood of coronary heart failure
- reduction in likelihood of stroke
- reduced risk of Type 2 diabetes

Recovery Rates – the amount of time it takes for your heart rate to return back to resting rate after you have finished exercising. The quicker this happens, the fitter you are thought to be.

Effects on the skeletal system- bone density increases, reduced chance of osteoporosis and arthritis. Bones , cartilage and surrounding tissues become stronger. Synovial fluid becomes more lubricated. Flexibility improves.

Immediate physiological effects of exercise on the body.

- Breathing rate becomes faster and deeper
- Body temperature increases
- Sweating starts and the body requires fluid
- Muscles begin to ache and cramp up due to the build up of lactic acid.

EFFECTS OF EXERCISE ON THE MUSCULAR SYSTEM

- Hypertrophy and Increased Strength
- Increased in Tendon Strength
- Increased Myoglobin and Mitochondria
- Increased Tolerance to Lactic Acid
- Increased storage of glycogen and fat
- Increased muscle strength

The respiratory and cardiovascular systems work together to help the performer meet the increased demands of exercise.

- As the breathing rate increases it draws air in to the body faster
- Gas exchange can occur more quickly, and the increase in blood flow (due to increased heart rate and stroke volume.) means that the blood can pick up more oxygen from the lungs and transport it more quickly to the muscles.
- There is an increased oxygen delivery to the muscles from the lungs and increased removal of carbon dioxide from the muscles to the lungs. (Gaseous exchange)

Glossary:

Respiratory system- the organs in the body used for breathing. Their role is the production of energy and moving oxygen and carbon dioxide in and out of the body.

Inspiration- the process by which we inhale air. (breathe in)

Expiration- the process by which we exhale air. (breathe out)

Composition of air- the gases that make up air.

INSPIRED AIR

Nitrogen- makes up 78%

Oxygen – makes up 21%

Carbon dioxide- makes up 0.04%

EXPIRED AIR

Nitrogen- makes up 78%

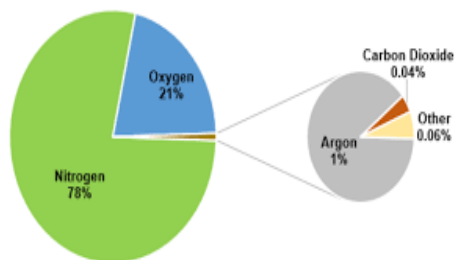
Oxygen – makes up 16%

Carbon dioxide- makes up 4%

Tidal volume- the amount of air that is breathed in or out in one normal breath

Lung volume- refers to the capacity of the lungs(how much air they can hold)

Vital capacity- the maximum amount of air the lungs can expire (breathe out) after the maximum breath in.



Nitrogen-

- ✓ Largest % of gas
 - ✓ Same amount is breathed in as is breathed out
 - ✓ Nitrogen is not used during exercise
- So it neither goes up in % or down.

Oxygen-

Levels decrease as oxygen is used in the production of energy for performance or recovery. 21% in 16% breathed out. So the working muscles and vital organs use 5%.

Carbon Dioxide-

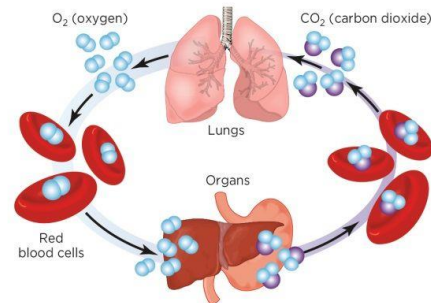
Levels increase as CO₂ (carbon dioxide) is produced as a by-product of energy production.



Lung Volumes

LUNG VOLUME	DEFINITION	TYPICAL REST VALUE	CHANGE DURING EXERCISE
Tidal volume (TV)	Volume inspired or expired per breath	500ml	Increase
Inspiratory reserve volume	Maximal volume inspired following end of resting inspiration	3100ml	Decrease
Expiratory reserve volume	Maximal volume expired following end of resting expiration	1200ml	Decrease
Residual volume (RV)	Volume of air remaining in the lungs at the end of maximal expiration	1200ml	Remains the same

Fig 1. Gas exchange in humans



1% of air is made up of inert gases such as argon and helium.

2	4.00260	10	20.179	18	39.948
He		Ne		Ar	
Helium		Neon		Argon	
36	83.80	54	131.30	86	(222)
Kr		Xe		Rn	
Krypton		Xenon		Radon	

Lung volumes.

The greater the volume of the lungs, the more air they can hold.

When our bodies are at rest, breathing is slower and shallower than when exercising. This is because the demand for oxygen is less. However-

During exercise you need to increase the air flow in and out of your lungs. Because- you need to get more oxygen to the working muscles for energy production and better performance levels. Equally you need to exhale the increased level of carbon dioxide that exercise produces in the body.

Tidal volume at rest= 12 breathes per minute approx. 0.5 litres of air per breath therefore- 6 litres of air per minute. During exercise there is an increase in tidal volume and breathing rate. Eg- could breathe up to 150 litres of air per minute.

Glossary:

Respiratory system- the organs in the body used for breathing. Their role is the production of energy and moving oxygen and carbon dioxide in and out of the body.

Inspiration- the process by which we inhale air. (breathe in)

Expiration- the process by which we exhale air. (breathe out)

Passage of air

Air in- 1.through mouth cavity and nasal passage

2. Passing over the larynx and pharynx into

3.Trachea- the windpipe

4. Splits into 2 tubes called bronchi that split into the

5. Right and left bronchus(lungs)

6. Bronchi subdivide again into

bronchioles.

7. At the end of the bronchioles are millions of small air sacs called alveoli.

8. Gaseous exchange occurs in the alveoli- where oxygen diffuses into the blood stream through capillaries during inspiration.

8. During expiration carbon dioxide, nitrogen and reduced levels of oxygen are breathed out in the reverse pathway.

Diaphragm- sheet of muscle under the rib cage that aids respiration.

Gas exchange- gases move from areas of high concentration to areas of low concentration.

Alveoli- millions of tiny air sacs

Alveolus- a single air sac

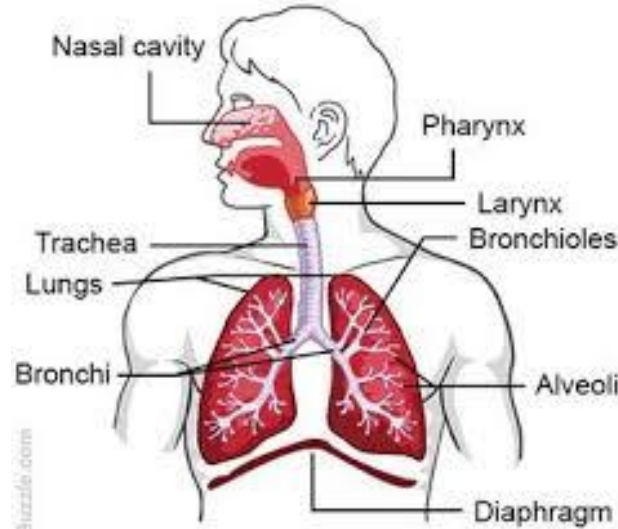
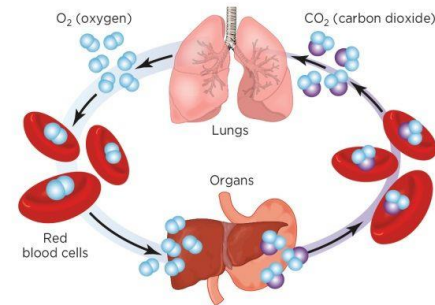


Fig 1. Gas exchange in humans



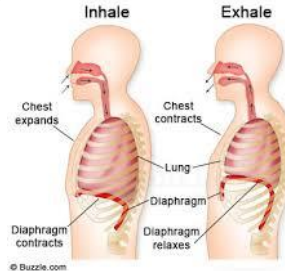
Respiration is everything you use to breathe and produce energy for the working muscles and vital organs.

Air passes through the nose/ mouth and then into the **trachea**. The **trachea** then splits into two tubes called **bronchi** (each tube is a **bronchus**, one going to each lung.

The **bronchi** subdivide(split) into many smaller tubes called **bronchioles**. The bronchioles finally end at millions of small air sacs called **alveoli**.

The alveoli have a large surface area and very thin walls so gases can easily pass through them into the **capillaries**. During inspiration- Oxygen, N and CO₂ diffuses into the blood stream and is taken to the working muscles via network of blood vessels. During expiration CO₂, N and reduced levels of oxygen are breathed out in the reverse pathway.

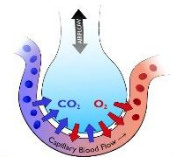
Diaphragm – air in / air out



Gas exchange alveoli to capillaries.

- ✓ Alveoli – high concentration of oxygen
- ✓ Capillaries surrounding the alveoli (from the muscles) low concentration of oxygen
- ✓ Movement of oxygen from high concentration to low through the thin walls of the alveoli and capillaries. Capillaries gain oxygen from the alveoli and transport it around the body.

The exchange of gases happens through a process called **diffusion**. This means the gases move from a place of high concentration to a place of low concentration.



BUSINESS STUDIES

How do businesses respond to changes in legislation?

New legislation can give businesses an opportunity to grow/expand or can become a threat to its survival.

How businesses respond will depend on the impact that it will have.

For example the law stating an 'increase in National Minimum wage' increases staffing costs, how does a business respond? One possible response is to cut staffing, or increase prices or make saving through some other initiatives

How do businesses respond to changes in legislation?

Businesses can find it expensive to respond to changes in technology. Changes can also take time.

However, if changes are not made, it can become problematic for businesses to survive in the long term.

For example, black cab drivers had to respond to Uber entering the taxi market. In order to compete, Black cab drivers now have free ultra-fast Wi-Fi, contactless card readers and zero emissions cabs.



EXAMPLE CHANGE	→	IMPACT OF CHANGE	→	POSSIBLE RESPONSE
An increase in the National Minimum Wage	→	Increase staffing costs	→	<ul style="list-style-type: none"> • Reduce staff • Increase prices • Make other savings
Stricter health and safety rules	→	Current product can no longer be sold	→	<ul style="list-style-type: none"> • Withdraw product • Make changes to product



How do businesses respond to changes in Economic climate?

How a business responds will depend on whether the economic climate is favourable or not.

- Business will consider making changes to the product. For example making products smaller or changing a recipe
- A business may try targeting a different type of customer .
- They may change their selling prices

Glossary:

REVENUE

Revenue is the money generated from selling products/service

FIXED COSTS

Are costs that **DON'T** change when sales go up or down i.e. they **DO NOT** vary with output. E.g. Rent, salaries, insurance.

VARIABLE COSTS

Are costs that **DO** change when sales go up or down. i.e. they **DO** vary with output

TOTAL COSTS

All the costs a business must pay in a set period of time.

START – UP COSTS

Start-up costs are not paid on a regular basis and are often one off. E.g. buildings, equipment and machinery.

RUNNING COSTS

Costs a business pays regularly even if no products are made

INTEREST

The cost of borrowing from a bank or other lender

MARGIN OF SAFETY

The difference between the break even level of output and actual level output.

BREAK EVEN =

The point at which **sales revenue = total costs**.

At this point the business is neither making a **profit** nor a **loss**.

Calculating break even without using a graph.

Break even charts can be time consuming to make so often a formula is used instead:

$$\text{BREAK EVEN} = \frac{\text{FIXED COSTS}}{(\text{SELLING PRICE} - \text{VARIABLE COST PER UNIT})}$$

MOS = CURRENT OUTPUT – BREAK EVEN OUTPUT

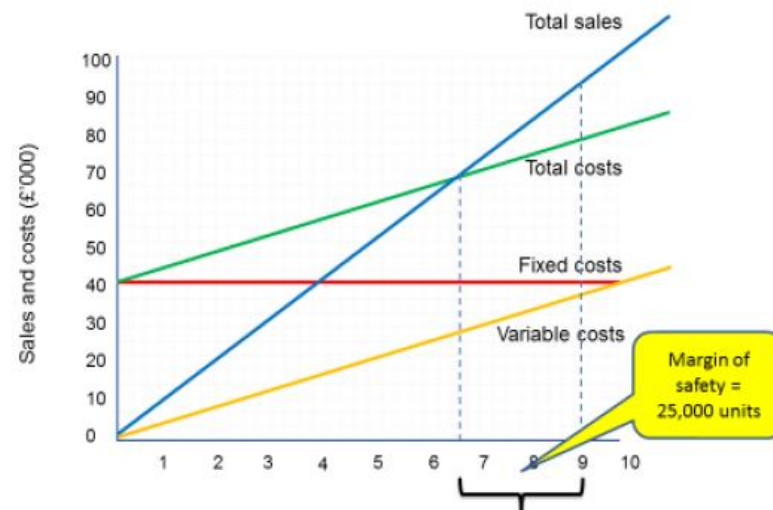
In this example = 90,000 – 65,000 = **25,000 units**

Profit or loss?

The profit calculation will either be positive or negative.

If positive the business is selling more products than cost of making them.

If making a loss, they are selling for less than they are making them for.



REVENUE

Most revenue comes from selling products or services often known as 'Sales Revenue'

$$\text{Revenue} = \text{Selling price} \times \text{Quantity Sold}$$

COSTS are the spending that is necessary to set up and run a business.

TOTAL COSTS

All the costs a business must pay in a set period of time.

$$\text{Total Costs} = \text{Fixed Costs} + \text{Variable Costs}$$

FIXED COSTS

Are costs that **DON'T** change when sales go up or down i.e. they **DO NOT** vary with output. E.g. Rent, salaries, insurance.

VARIABLE COSTS

Are costs that **DO** change when sales go up or down. i.e. they **DO** vary with output. E.g. Raw materials, electricity, wages.

$$\text{Variable Costs} = \text{Variable cost per unit} \times \text{Output}$$

Glossary:

Motivation:

Getting employees to do a better job with incentives such as increased pay or improved working conditions.

Remuneratio:

Payment for work carried out. Either as a weekly wage or monthly Salary

Bonus:

staff receive a bonus for meeting targets set by their manager

Commission:

staff are paid for the number of items they sell

Promotion:

Giving staff additional responsibility to help them move up their career ladder

Fringe

benefits: Payments in kind, eg a company car or staff discounts

Financial motivation

This is a method of paying employees extra to motivate them to stay on or do a better job. Methods include.

- **Remuneration**- wage paid weekly usually by hourly rate- salary- paid monthly so no overtime is made available.
- **Bonuses**- Staff may cut corners in order to get the bonus
- **Commission** - good for encouraging staff to go beyond their normal workload, but can put pressure on them to perform extremely persuasively with customers to gain sales.
- **Fringe Benefits**- not paid in cash but incentives for keeping good staff
- **Promotion**- effective for retaining good staff

Non financial motivation

- **Job rotation** –staff change jobs they do on a regularly basis- can remove boredom of repetitive tasks but does require training
- **Job enrichment**- giving staff more responsibility and more challenging jobs
- **Autonomy**- Freedom to make decisions, especially for team leaders but they will be held responsible if sales decrease.



Motivation



Glossary:

Internal:

Within the company

External:

Outside of the

company

Finance:

How a company might finance growth

Profit:

Revenue-

Total costs

Assets:

Something owned by the company

Loan : a method of borrowing, usually from the bank,

Methods of Business Growth

<u>Internal growth</u>	<u>External growth</u>
Internal growth occurs when a business expands by itself, by bringing out new products or by entering new markets. It is also known as organic growth. Two common methods are: <ul style="list-style-type: none"> • Introducing new products • Entering new markets 	External growth occurs when a business expands by joining with another business. It is also known as inorganic growth. Two common methods are: <ul style="list-style-type: none"> • Mergers • Takeovers

Advantages of Internal Growth

- More sustainable as slower
- Less risk than external growth
- Builds on a firm's existing strengths

Disadvantages of Internal Growth

- Growth based on the growth of the market
- Slow growth
- Hard to increase market share if a market leader

Sources of finance to grow a Business

<u>Internal sources of Finance</u>	<u>External sources of Finance</u>
Internal sources of finance are found within the business and can include: <ul style="list-style-type: none"> • Retained profit • Selling assets Profit is the amount of revenue left after costs have been deducted. This can be used to either pay dividends to shareholders or kept in the business to fund future business activities. The advantage of this is that there is no need to repay the finance and there are no interest charges. However the amount available may be limited and investors, for example shareholders may be frustrated by the lack of dividends.	External sources of finance are found outside the business, such as: <ul style="list-style-type: none"> • Loan capital • Share capital Loan capital is finance borrowed from a financial institution such as a bank. The money has to be repaid over a specified period of time and with interest. Loan capital is often acquired for a specific purpose, such as in order to buy an asset in which case it can be secured against that asset. This reduces the risk being taken by the lender which makes it more likely to lend the business money. For example if a printing firm wanted to buy a new four colour printing press, it could secure the printing press against the loan. If the printing firm then stopped repaying the loan, the lender can take possession of the press and sell it to regain the loss.

Disadvantages of External Growth

- May be a clash of culture
- May be stopped by the competition authorities
- Increased costs in the short term

Advantages of External Growth

- Quicker than internal growth
- May get rid of competition
- Can get new ideas and new expertise

Glossary:

Internal: Within the company

External: Outside of the company

Finance: How a company might finance growth
Profit: Revenue-

Total costs

Assets: Something owned by the company
Loan : a method of borrowing, usually from the bank,

Sources of Finance

Selling Shares: Creating new shares that can be sold on the stock market

Retained Profit: Profit kept within the business that is not paid out in dividends to the shareholders. This source of finance is the best if the business wants to expand.

Bank Loan: This is an arrangement where the amount borrowed must be repaid over a clearly stated period, in regular instalments. The amount is paid back with interest.

Selling Assets: Selling items that the business owns to raise funds. For example, selling property or machinery.

Public Limited Company

A company that sells its shares on the stock market

This makes it much easier to raise finance but makes the business prone to

Glossary:

Aims: Long term goals within a business

Objectives: Short term goals used to help achieve the aims

Legislation: The laws set out a business needs to follow

Internal: Inside the company

Entrepreneur: Someone who comes up with a business idea/starts a business

Business Aims and Objectives

Business aims are the broad targets than an entrepreneur has at the back of their mind

Business objectives are clear, measurable targets of how to achieve business aims. (the stepping stones for how they are going to achieve them)

Smart Aims and Objectives

SPECIFIC - Objectives should **specify** what they want to achieve. - i.e. one named person is responsible for delivering the objective

MEASURABLE - You should be able to **measure** whether you are meeting the objectives or not.

ACHIEVABLE - can the objectives be met?

REALISTIC - Can you realistically achieve the objectives with the resources you have?

TIMED - When do you want to achieve the set objectives? i.e. within a given period e.g. 12 months

Reasons for changes in Business Aims and Objectives

Influence	Description
Changing market conditions	Markets evolve over time. For example customers now want more luxury chocolate. As a result, Cadbury is now setting new objectives in relation to the luxury/higher prices segment of the UK chocolate market.
Changing technology	Due to advances in technology businesses have had to respond. For example Ted Baker's sales accelerated dramatically after introducing ecommerce. They were then more ambitious in their sales targets. With the help of ecommerce Ted Baker grew their whole business by 17.7% in 2016.
Changing performance	If costs start to rise, profits will be squeezed. This is linked to the performance of the business or it could be the industry as a whole. When this happens new objectives will need to be set to cut back costs to increase profits. A new manager will usually be appointed.
Changing legislation	Changes in legislation influence aims and objectives. Or example after Britain voted to leave the EU there was great uncertainty about what changes would be made to EU laws. Some may be beneficial, others not. This makes setting new objectives very difficult.
Internal reasons for change	Aims and objectives are influenced by a change at the top of the business. If a boss is pushed out and a new one is appointed there will be changes to aims and objectives.

iMEDIA

You will use all the techniques learnt in unit R081 and further expanded in unit R082.

Both were compulsory units, which taught you the basis of how to complete any digital work, including video/sound/websites/comic strips/etc.

Your teacher will select two new unit for you to complete this year.

See next slide for a selection of some units your teacher will have considered dependant upon your confidence levels in the two compulsory units and resources available.

Each unit is designed to provide you with the opportunity to build a portfolio of evidence to meet the learning outcomes for that unit

Units	Assessment method	GLH	J807 Award 60 GLH	J817 Certificate 120 GLH
R081: Pre-production skills	Written paper 1 hour 15 minutes	30	M	M
R082: Creating digital graphics	Centre assessed task, OCR moderated	30	M	M
R083: Creating 2D and 3D digital characters	Centre assessed task, OCR moderated	30	N/A	O
R084: Storytelling with a comic strip	Centre assessed task, OCR moderated	30	N/A	O
R085: Creating a multipage website	Centre assessed task, OCR moderated	30	N/A	O
R086: Creating a digital animation	Centre assessed task, OCR moderated	30	N/A	O
R087: Creating interactive multimedia products	Centre assessed task, OCR moderated	30	N/A	O
R088: Creating a digital sound sequence ^Δ	Centre assessed task, OCR moderated	30	N/A	O
R089: Creating a digital video sequence ^Δ	Centre assessed task, OCR moderated	30	N/A	O
R090: Digital photography	Centre assessed task, OCR moderated	30	N/A	O
R091: Designing a game concept	Centre assessed task, OCR moderated	30	N/A	O
R092: Developing digital games	Centre assessed task, OCR moderated	30	N/A	O

Each unit has the same number of learning outcomes. [4]
Learning outcome **requirements will change** depended upon the unit you are undertaking

Learning Outcome 1:

Understand
uses/properties of digital
media in unit brief

Learning Outcome 2:

Plans for
completion of
tasks

Learning Outcome 3:

Creating artefacts

Learning Outcome 4:

Review finished
artefact

Information for each unit

30 GLH

Centre assessed tasks

60 marks (60 UMS)

Centre assessed and OCR moderated

You must use the marking criteria to ensure all tasks are completed to the highest standards to gain the highest marks possible.

Candidate Name		
Criteria		
LO1: Understand the purpose and properties of digital graphics.		
MB1: 1-3 marks	MB2: 4-6 marks	MB3: 7-9 marks
Produces a summary of how and why digital graphics are used, demonstrating a limited understanding of the purpose of digital graphics.	Produces a summary of how and why digital graphics are used, demonstrating a sound understanding of the purpose of digital graphics.	Produces a summary of how and why digital graphics are used, demonstrating a thorough understanding of the purpose of digital graphics.

**R082 learning outcome 1
example mark grid**

COMPUTER SCIENCE

Review the NEA structure that may be helpful to complete the controlled assessment tasks

ANALYSIS

Analysis Section	
Requirement	Completed?
Explanation of the task that you need to complete, say what it will need to do	
Break down of the main task, listing the smaller sub-tasks	

DESIGN

Design Section	
Requirement	Completed?
Success Criteria – a list of success criteria for the requirement.	
Pseudocode of the solution	
Flowchart of the solution	
Test plan – this should detail the tests that will be carried out after development.	

DEVELOPMENT

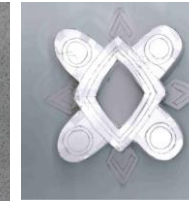
Development Section	
Requirement	Completed?
Screenshot of the finished user interface with all controls labelled	
All of the code is screenshot	
The code is annotated and explains in detail what it does	
Explanation showing how you developed the code bit by bit to get your finished solution	
Screenshots and evidence of problems you had and changes you made to solve them	
Screenshots and evidence of any tests you carried out as you developed the program to test that sections were working	

TESTING AND EVALUATION

Testing & Evaluation Section	
Requirement	Completed?
Testing table completed for all of the tests outlined in the test plan	
Screenshot evidence of each test passing or failing	
Any tests that failed, should be correct and explanation of what you did to correct the problem	
An evaluation that explains how you have/haven't met each of the success criteria identified in the design.	

ART

Scale is a design element which relates to size. **Scale** is the size of one object in relation to the other objects in a design or art work. A **scale model** of a building or object is a model of it which is smaller than the real thing but has all the same parts and features.



Development process from 2D design to 3D construction



Final design with measurements and scaled calculations.



3D model- paper



3D card construction

Colour symbolism is the use of colour as a representation or meaning of something that is usually specific to a particular culture or society. There is great diversity in the use of colours and their associations between cultures and even within the same culture in different time periods.

African Colour Symbolism

RED: Nigeria - Death, wealth and aggression. Some Areas: Good luck

WHITE: Ethiopia – Illness and purity. **Nigeria:** Good luck and peace. **South Africa (Zulu):** Goodness.

Zambia: Goodness, cleanliness and good luck.

BLACK: Ethiopia - Impure, unpleasant and death.

YELLOW: Preciousness, royalty, wealth, spirituality, fertility and the sun.

BLUE: Spiritual, good fortune, peacefulness, harmony and love.

GREEN: Growth, fertility, prosperity, fruitfulness, abundant health and spiritual rejuvenation.

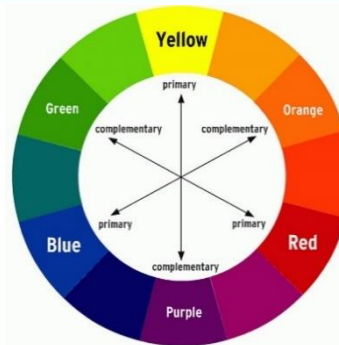
PURPLE: Symbolises healing. It is also associated with women. Purple cloths are mostly worn by females.

SILVER: Associated with the moon which represents the female essence of life. Often used in marriage ceremonies.

GOLD: Royalty, wealth, elegance, high status, supreme quality, glory and spiritual purity.



Colour is the element in art of reflected light that is interpreted by the eye. **Colour** in art is based on colour theory, which is composed of three basic parts: the colour wheel **hue**, colour **value** and **colour schemes**.



Aesthetics, is a branch of philosophy that deals with questions of beauty and artistic taste. It is concerned with the nature and appreciation of beauty, what is considered aesthetically pleasing.

Painted African inspired pieces.

Monochromatic



Monochromatic colour schemes are derived from a single hue or colour and extended using its shades, tones and tints. Tints are achieved by adding white and shades and tones are achieved by adding a darker colour, grey or black.

Complementary/Contrasting



Complementary or contrasting colour schemes use colours which are opposite each other on the colour wheel. The high contrast of complementary colours creates a vibrant look especially at full saturation. This colour scheme must be managed well so it is not garish.

Harmonious/Analogous



Harmonious colour schemes use colours which are next to or near to one another on the colour wheel, eg; red, purple, blue. This creates a balanced, unified colour scheme.

Analogous colour schemes use groups of three colours that are next to each other on the colour wheel eg; red, red-orange, and orange. An analogous colour scheme creates a rich, monochromatic look

GRAPHICS

In the News Design development

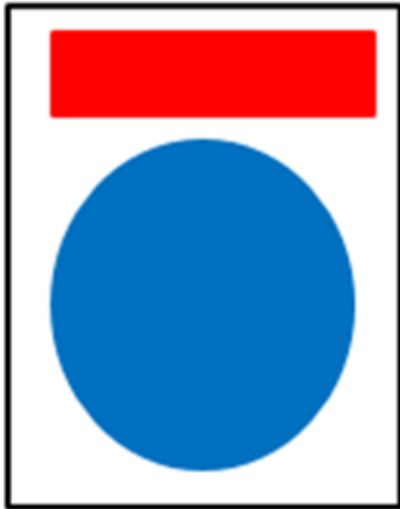
You need to take influence from your own research inline with your chosen starting points and secondary artists. Include inspiration from artists you have researched, further research and images from your photographs. Your final design must Include imagery and text.

When creating your initial poster designs you consider the composition carefully:

1. The focal point
2. Balance
3. Repetition

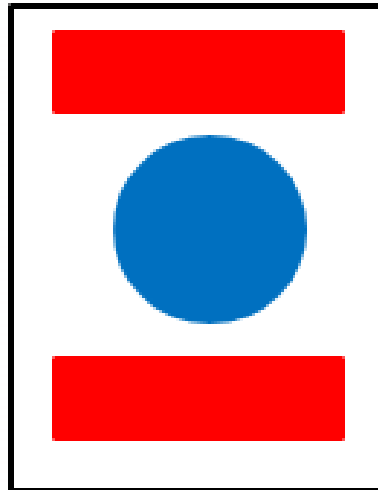
Focal Point

A focal point is the area in the composition to which the viewer's eye is naturally drawn.



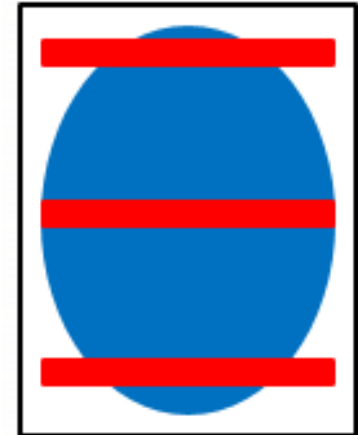
Balance.

Either making the poster or artwork symmetrical or giving equal weight/ space to each of the components- image and text.



Repetition

This gives either the element you are repeating more importance and forces it to be the focal point and creates layers. You can also create repetition in the colour and media you use.

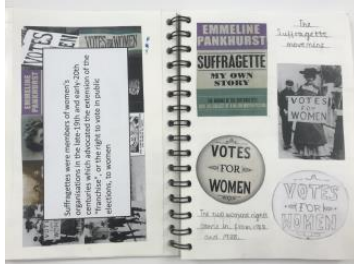


Year 11 Component 2- Design process

"If you believe you can achieve!"

Starting point: In the News

This student chose to focus their work on the centenary of women's right to vote. They have included information about the Suffragette movement and historical photographs from newspapers and posters.



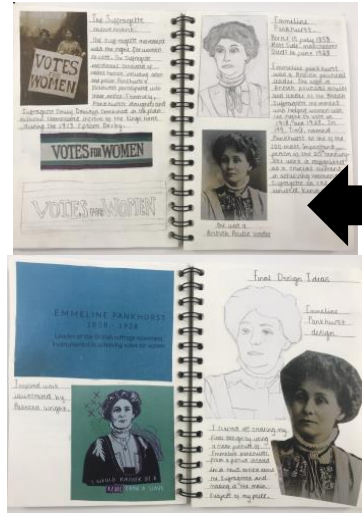
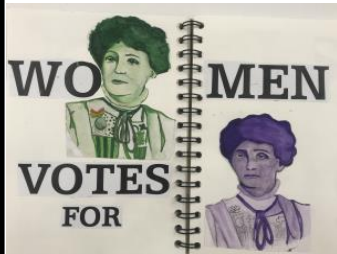
Research:

Research studies of the work of different artists, exploring a range of media and techniques. Studies are annotated giving information about the artist and their work relating to the theme "In the News"



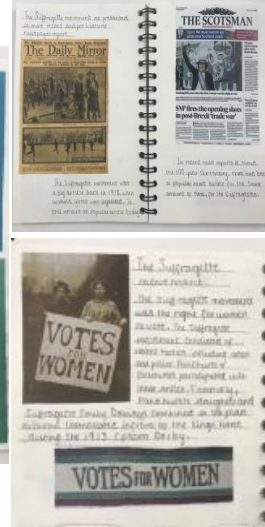
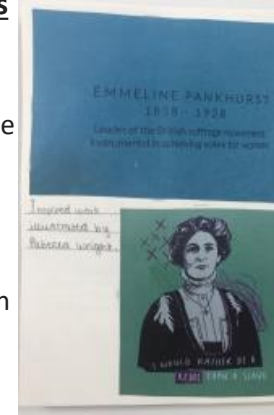
Design ideas:

Development of design ideas from drawings of research images from secondary sources. Exploring use of text and design compositions.



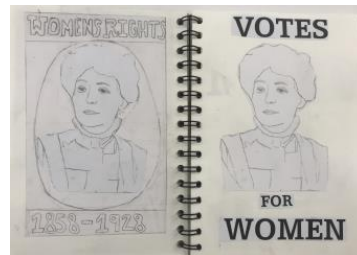
Further research: Secondary sources

Relevant images from books, newspapers and the internet used to inform their design development. Annotations giving factual information about Emmeline Pankhurst and the suffragette movement.



Development of final design:

Developing design ideas in to a final design. The selection of the most successful design ideas, text, colour scheme and use of media. Annotations used to explain how all are continually linked to the theme "In the News" and are informed by the artists studied.



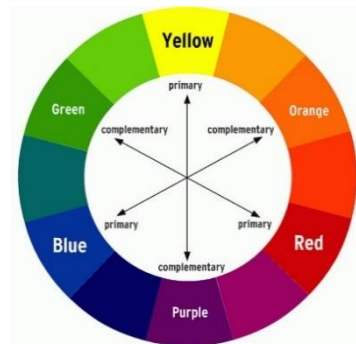
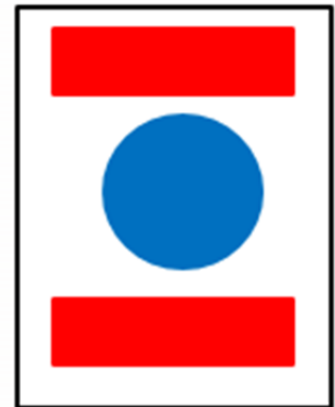
Final Piece:





In the news theme:
Suffragettes.
Centenary of women's
right to vote.

A historic theme of women's rights and the suffragettes, influenced by a modern poster through its limited colour palette and composition.



MUSIC BTEC

Learning aim A – Understanding different types of organisations that make up the music industry

Venues and Live performances

- Small and medium local venues
- Large multi space venues

Health and Safety

- Health and safety in the work place
- Responsibility of venues to ensure health and safety of staff and audience
- Risk assessments
- Policies and procedures in relations to health, safety and security

Production and Promotion

- Record companies
- Music publishing
- Promoters
- Broadcasting
- Marketing and distribution

Service companies and agencies

- Royalty collection agencies
- Artists' representation
- Hire companies
- Transport companies

Unions

- Musicians union -MU
- Equity
- Broadcast Entertainment Cinematograph Theatre Union - BECTU

How organisations interrelate

Learning aim B – Understanding job roles in the music industry

Performance/Creative roles

- Musician
- Composer/songwriter/producer
- Musical director
- Live sound technician
- Roadie
- Instrumental support/guitar tech/drum tech

Management roles

- Artistic management
- Venue management
- Studio management
- Promoter
- Marketing
- A&R (Artists and Repertoire)

Recording roles

- Recording studio personnel
- Producer
- Session musician
- Mastering

Media and other roles

- Music journalist/blogger
- Broadcaster
- Software programmer/app developer
- Retail and distribution

Employment in the industry

- Full time/part time/freelance
- Permanent/casual
- Self employed
- Volunteers

Payment in the industry

- Contracts/invoices
- Tax/Ni/
- Fee/negotiation

Unit 5 Learning aim A

develop your music performance skills and review your own practice

You should take part in regular rehearsal activities designed to develop your technical music performance techniques in relations to singing or your chosen instrument.

Techniques:

- Accuracy of pitch/intonation
- Rhythm and timing
- Technical exercises to improve technique – e.g. scales/rudiments
- Expression and dynamics
- Phrasing
- Range
- Sight reading/singing
- Improvisation
- Breath control
- vibrato
- Confidence
- Tuning
- Following and accompaniment
- Learning repertoire
- Musical interaction
- Stage presence

Interpretation:

You must show an awareness of interpretive skills and stylistic qualities relevant to your instrument/voice and use them to improve your technique and performance.

- Emphasis
- Accurate interpretation and reproduction of style
- Awareness and appreciation of accompaniment
- Physical expression
- Communication in performance – with other musicians and the audience
- Use of timing and rhythm
- Intonation
- Phrasing
- Expression and use of dynamics
- Projection
- Focus
- Musicality/sensitivity
- Stage presence

Review:

Review your own practice:

- Identify strengths and areas for development
- Respond to teacher feedback
- Respond to peer feedback
- Review performance skills/rehearsals on video

Glossary:

Pitch – how high or low the note is

Intonation – pitch accuracy

Rhythm – pattern of notes of varying lengths

Timing – playing in time with the pulse at the correct speed

Scales – exercises which follow a defined sequence

Rudiments – technical exercises for drummers

Expression – following the expressive intentions set by the composer – performance directions

Dynamics – the volume as indicated by the composer

Phrasing – sentences in music

Range – range of the pitch

Sight reading/singing – reading music by sight at the first viewing

Improvisation – spontaneous – without prior preparation

Breath control – controlling breath through the instrument or vocals

Vibrato – fluctuation of pitch - vibrating

Confidence – performing without hesitation or nervousness

Tuning – the way in which an instrument or string is tuned

Accompaniment – a musical part which supports an instrument, voice or group

Repertoire – a list of pieces/songs which are rehearsed and ready to perform

Interaction – conveying the music to the audience and showing an awareness and communication with fellow performers

Stage presence – commanding the attention of the audience

Projection – strength of singing/performing where the voice/instrument carries clearly

Unit 5 Learning aim B

Use your music performance skills within rehearsal and performance

You must demonstrate your skills in rehearsals and **perform at least two contrasting pieces**

Music rehearsal skills

- Warm ups
- Physical preparation – e.g. relaxation/breathing techniques/technical exercises
- Learning repertoire
- Rehearsing – with accompaniment/band
- Receiving and giving constructive and positive feedback

Personal Management skills

To effectively operate as a musician, you need to demonstrate professional and personal management skills:

- Independent practice
- Attendance
- Time management – rehearsal schedules
- Readiness to work – being prepared with the correct equipment
- Listening to instructions/directions
- Observing safe working practices
- Willingness to try things out
- Concentration and focus on tasks
- Appropriate interaction with others – trust and cooperation
- Rehearsal discipline
- Showing sensitivity towards others

Music skills in rehearsal and performance

You must develop and demonstrate relevant skills during the rehearsal and performance process:

- Accuracy of pitch
- Rhythm and timing
- Intonation
- Expression and dynamics
- Phrasing
- Range
- Sight reading/singing
- Improvisation
- Breath control
- Vibrato
- Confidence
- Tuning
- Following and accompaniment
- Musical interaction
- Stage presence

Interpretive skills and stylistic qualities

You must demonstrate relevant musical qualities during the rehearsal and performance process:

- Accurate interpretation and reproduction of style
- Awareness and appreciation of accompaniment
- Physical expression
- Communication in performance – with other musicians and the audience
- Use of timing and rhythm
- Intonation
- Phrasing
- Expression and use of dynamics
- Confidence
- Stage presence

MUSIC GCSE

Component 1 – Understanding Music

AoS1 The Western Classical Tradition 1650-1910

The Coronation Anthems and Oratorios of Handel
The orchestra music of Haydn, Mozart and Beethoven
The piano music of Chopin and Schumann
The Requiem of the late Romantic period

Component 1 – Understanding Music – AoS1 Western Classical tradition 1650-1920 – Study work – Haydn Symphony 101 in D – movement 2.

- | | |
|-------------|-----------------|
| • Structure | Metre |
| • Harmony | Instrumentation |
| • Melody | Tempo |
| • Texture | Rhythm |



Component 1 – Understanding Music – AoS2 Popular Music – Study works revision and examination practice – 3 pieces from Sgt Pepeer's Lonely Hearts Club Band.

- | | |
|------------------|-----------------|
| • Structure | Metre |
| • ADT | Instrumentation |
| • Key signatures | Melody |
| • Harmony | Time signatures |



• Component 3 – Composition - Compositional devices:

- **Composition 1 – response to an externally set brief**
- **Composition 2 – free composition**

Combined duration must be a minimum of three minutes

Rhythm and Metre

e.g. Change of metre/compound/augmentation/diminution/cross rhythm/syncopation/dotted rhythms/triplets/rubato/tempo changes

Texture and melody

e.g. Homophonic/polyphonic/scalic/triadic/conjunct and disjunct movement/ornamentation/ostinato/riff/improvisation/imitation/canon/antiphonal/blue notes/passing notes

Structure and form

e.g. rondo/arch shape/theme and variations/minuet and trio/strophic/through composed/sonata/ground bass/popular song/blues

Harmony and Tonality

e.g. perfect, plagal, imperfect and interrupted cadences/major and minor tonality/modal tonality/diatonic harmony/inverted chords/modulation/7th chords/dissonance/pedal or drone/chromatic harmony

Timbre and dynamics

e.g. single instruments and/or voices/instrumental and/or vocal groupings/synthesised sounds/computer generated sounds/crescendo and diminuendo/reverb/tremolo/distortion/vibrato/falsetto

Phrasing and Articulation

e.g. legato/staccato/tenuto/marcato/accent/slurring/arco/pizzicato/tonging

Component 2 – Performance

- Preparation of solo performances – either one or more pieces of at least 2 minutes focusing on exam board criteria
- Preparation of ensemble performances – either one or more pieces of at least 2 minutes focusing on exam board criteria

Criteria for each performance:

Level of Demand

Technical control – accuracy of pitch, rhythm, intonation and fluency

Expression and articulation – ability to demonstrate expression and interpretation and sense of style appropriate to the piece and as directed by the composer

Glossary:

Melody

Conjunct – moving mainly by step

Disjunct – moving by leaps – not steps

Triadic – based on triadic movement

Broken chords – triad played separately

Scalic – based on the movement of a scale

Arpeggio – rising and falling melodies using the notes of a chord

Intervals within the octave – 2nd, 3rd, 4th, 5th, 6th and 7th

Passing notes – a note inserted between two main notes

Diatonic – uses notes that belong to the key

Chromatic – using notes outside of the key

Slide/portamento – rapid run of notes/pitch sliding from one note to another

Ornamentation: adding extra notes to decorate the melody

Acciaccaturas – a very short note played before the main note – a grace note

Appoggiaturas – delaying a note in a melody by introducing a note before it

Ostinato – a continually repeated musical phrase or theme

Phrasing – a musical sentence – shown by curved lines to allow for musicality and breathing

Articulation – **legato** – smooth – **staccato** - detached

Harmony

Diatonic – uses notes that belong to the key

Chromatic – using notes outside of the key

Consonant – notes blend together

Dissonant – notes clash harshly with each other

Pedal – sustained/held note – or repeated note usually in the bass

Drone – as pedal – more associated with folk music

Cadences:

Perfect – V – I – finished – as if the music is at an end – arrived 'home'

Imperfect – - V sound unfinished – as though the music wants to continue to I (home)

Interrupted – V-VI sounds unfinished – end up on a minor chord

Plagal – IV – I sounds finished – like and Amen at the end of a hymn

Tierce de Picardie – major ending in a minor key

Chord:

Major – made up of notes from a major scale – root, 3rd and 5th.

Minor – made up of notes from a minor scale – root, minor 3rd and 5th

Dominant 7ths – 4 note chord – major chord built on the 5th note of the scale with an added minor 7th

Chord symbols – e.g. C/D/F/G7

Roman numerals – used for chords - I,II,III,IV,V,VI,VIII

Tonality

Major and minor key signatures up to 4 sharps and flats: use musictheory.net

Modulation to:

Dominant – 5th (V) degree of the scale

Subdominant – 4th (IV) degree of the scale

Relative major/minor – distance of a minor 3rd – sharing the same key signature – e.g. C major – A minor

Tonic major/minor – First degree of the scale - e.g. C major – C minor

Structure

Binary – two sections to the piece – A B

Ternary – Three sections to the piece – the first being repeated at the end – A B A

Rondo – return of an idea – A B A C A D – section A returns in related keys

Arch-shape – symmetrical – forming an arch – A B C B A

Through-composed – relatively continuous – non-sectional and non-repetitive

Theme and variations – melody or theme followed by variations of the melody/theme

Sonata – exposition (I – V) development (various modulations) recapitulation (return on exposition – I)

Minuet and trio – in $\frac{3}{4}$ Minuet A: || B: || Trio A: || B: || Minuet A B

Scherzo and trio – in $\frac{3}{4}$ Scherzo replaced minuet – scherzo meaning 'joke'

Call and response – question and answer

Ground bass – repeated bass line over which melody is composed

Continuo – combination of keyboard (usually Harpsichord) and Bass (usually 'Cello') providing continuity common in Baroque music

Cadenza – solo section of a concerto where the soloist is able to demonstrate their ability performing technically difficult music

Sonority/Timbre

solos instruments – of all instrumental families

Concertos – 3 movement work for soloist accompanied by orchestra

Chamber groups – small ensemble of instrumentalists

Instrumental techniques:

Arco – with the bow

Pizzicato – plucked

Con sordino – with a mute

Texture

Homophonic – melody with accompanying chords

Polyphonic/contrapuntal – several melodies woven together

Imitative/canonic – repetition of melody in polyphonic texture/

Layered - several sounds are stacked on top of each other producing a thicker effect

Antiphonal – one part echoing another

A cappella – without instrumental accompaniment

Monophonic – single line melody

Melody and accompaniment – melody with chords accompanying

Unison – at the same pitch

Octaves – performed in octaves

Tempo, metre ad rhythm

Simple time – time signatures dividable by 2 or 4 – e.e 2/4, 3/4 and 4/4

Compound time – time signatures grouped in 3s – e.g. 6/8, 9/8 and 12/8

Regular – any time signature that does not change frequently

Anacrusis – note/motif precedes the downbeat

Common Italian tempo markings:

Allegro – fast

Andante – at walking pace

Moderato – at a moderate speed

Pulse – the basic beat

Augmentation – making the original note values longer – often double

Diminution – making the original note values shorter – often half

Hemiola – a note tied over a bar line giving the effect of a 2 beat rhythm in a piece with 3 beats in a bar

Semibreve – note lasting 4 beats

Minim – note lasting 2 beats

Crotchet – note lasting one beat

Quaver – note lasting half a beat

Semiquaver – note lasting a quarter of a beat

Dotted rhythms – sounds uneven – $\frac{3}{4}$ of a beat to $\frac{1}{4}$ of a beat

Triplets – 3 notes in the space of 2

Scotch snap – short accented note followed by a longer one

Rubato – expressive and rhythmic freedom

Pause – to hold a note of indefinite time

Tempo – the speed of the music

Dynamics and articulation

pp – pianissimo – very quiet

p – piano - quiet

mp - mezzopiano – medium quiet

mf – mezzoforte – medium loud

f – forte - loud

ff – fortissimo – very loud

Crescendo/cresc – gradually getting louder

Diminuendo/dim – gradually getting quieter

Sforzando/sfz – accent on one note

DRAMA

Year 11 Term 1: Component 2 Performing from a script

"If you believe you can achieve!"

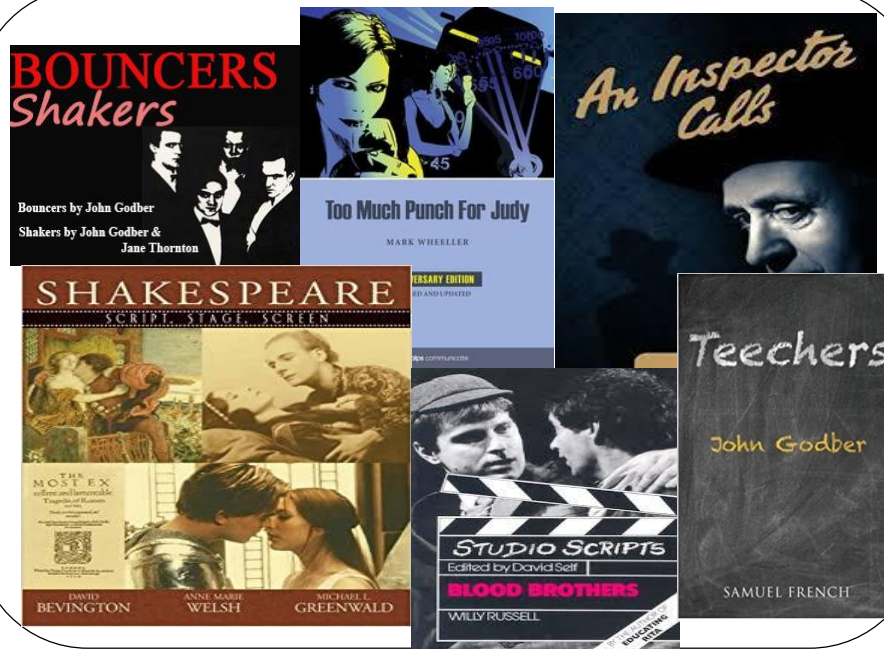
Tips for learning lines

1. Read the lines aloud. By speaking the lines, you will hear them, and they are more likely to stick.
2. Ask a friend to help you. Friends can correct you on any mistakes you make, give you the cue lines and go back over any weak areas.
3. Play a Game. Find a ball and either throw it between a partner or against a wall. Say your lines as you throw it, restarting from the top every time you drop the ball or mess up a line.
4. Little and often. Go over them first thing in the morning, a few times during the day and last thing at night.
5. Move around while you are saying your lines. The best thing to do is to act and feel the emotions of the character so that you are learning the meaning of the speech as much as the words.
6. Learn the cue lines that lead in to each of your lines. Being prompt with your lines will give you and your fellow actors more confidence.
7. As you say or read the lines, follow the thought pattern of each speech and the overall progression of the scene. Your lines are a part of the play. They don't exist on their own.
8. In rehearsals, listen to and think about what the other actors are saying. Don't just concentrate on what you've got to say.
9. Look, Cover, Pronounce, Check.

As part of Eduqas GCSE Drama you are required to perform two extracts from the same published text.

You will learn the lines and perform your artistic intentions to an external examiner.

You will consider costume, lighting and sound design for your performance.



Performance skills

Character – the use of vocal and physical characteristics

Voice

(pitch, tone, rhythm, pace, volume)

Emphasis – Highlighting the importance of a word.

Articulation – How you pronounce words

Intonation – the rise and fall of the voice. There's a clear movement up at the end of a sentence when we ask questions for example.

Physical

Facial expression – Using your face to communicate an emotion

Body language – Using your body to communicate feelings

Status - the hierarchy of a character

Gesture – a movement to communicate meaning

Stance – How you stand in role as the character

Posture – The position of the body when sitting or standing

Gait – the way a performer walks on and off stage

Status – the hierarchy of the characters

Proxemics – the distance between the characters to show a relationship

Style – how the acting is performed for example, naturalistic, physical theatre or Theatre in Education

Rehearsal techniques

Given circumstances – the who, what, where, when of the scene

Hot seating – Answering questions in role

Role on the wall – developing facts and feelings about your character

Marking the moment – Making part of the performance obvious to the audience

Forum theatre – stopping the performance to highlight areas of development

Thought Tracking – the thoughts of the character being told to the audience

Off text improvisation – creating a scene based on the knowledge of your character

Things to consider

Focus – the actors ability to stay in role

Use of space/ spatial awareness – Being aware of what is around you

Timing - Keeping a regular pace to keep the audience engaged

Staging – choosing and using appropriate staging

Blocking – positioning the actors on stage

Ensemble – a group of people that perform together

Levels – different heights used to create visual interest or show status

Tension – creating atmosphere and mood for the audience

Genre – a type or category such as comedy or horror

Plot

Act 1 – Mark and Jan discuss that someone is 'dead', this throws the audience into the middle of the action. Leah talks and Phil eats. John Tate is stressed and tries to keep control over the group by using fear and threats. Richard threatens his leadership but this is suppressed. When Mark and Jan arrive they explain to the group their version of events leading up to Adam falling into a grille. They try to justify their actions. Phil finally speaks and devises a plan to frame a non-existent person.

Act 3 – By act 3 scene 3, Cathy is second in command and is nominated to Kill Adam. A conversation takes place between her and Phil despite Leah's attempts to be heard, she is ignored by both of them.

Act 2 – Leah is still trying to get Phil's attention. The police have found a man that fits the description of the man Phil concocted because Cathy used her initiative to find a man that matches the description. The plan has gone wrong. Brian is refusing to go to the police station to identify the man who is being framed. Phil threatens him with being killed just as Adam was on the grille. He agrees to go. Leah tries to get Phil's attention again.

Act 4 – Jan and Mark reveal someone has 'gone' this turns out to be Leah. Richard tries to convince Phil to re-join the group. He tries to gain his attention in a similar way to Leah. Phil doesn't speak nor eat as he usually would. Richard tells him what has happened to the rest of the group. Richard appears to have taken the place of Leah as he sits in the field with Phil.

Characters

Mark and Jan – Act as the narrators as part of a 'chorus'. They throw the audience directly into the action at the beginning of each act.

Leah – is a moral character and tries to reason with many of the other characters. She is sensible and able to think for herself, however she still falls under the leadership of Phil.

Phil – the boyfriend of Leah, although on stage in many scenes, Phil rarely speaks. Usually his actions involve eating.

John Tate – only appears in Act 1 scene 3. He leads using fear to control others. However, he is visibly falling apart as he panics and is unable to control the situation.

Cathy – Has no remorse about the group's actions. She finds the situation 'exciting' and later becomes quite violent.

Richard – first appears to be a strong character. Although he stands up to John Tate, he is always put back in his place.

Brian – is the weakest in the group. The other characters see him as weak and vulnerable and someone the police would believe.

Danny – A sensible character with aspirations.

Lou – will follow whoever is the leader. She is a 'yes' woman, controlled by fear.

Adam – is the victim.

Themes

Gangs – a mob mentality was created when the characters all acted the same way as those around them towards Adam's death

Morality – Leah is the only character who has any morals and wants to do the right thing

Power – Bullying is used to gain power, the power shifts throughout the play with John Tate being the leader followed by Phil.

Murder – All the gang are responsible for Adam's death.

Guilt – The characters fail to take responsibility for their actions some feel guilty and others don't.

Locations



A street



A field



A wood

ENGINEERING

Year 11 Engineering Manufacture R109

"If you believe you can achieve!"


Unit R109- Learning Objective 1 Engineering materials, processes and production

Types of materials		
Ferrous Metals	Ferrous metals which contain iron. They may have small amounts of other metals or other elements added, to give the required properties. They will corrode if unprotected	Iron, carbon steels, high speed steels
Non Ferrous metals	Non Ferrous metals which do not contain iron. Pure metals (have no other metal or element)	Copper, brass, bronze, aluminium, zinc, tin, lead, titanium
Polymers		
Thermo plastics	Thermo Plastics -usually a plastic polymer, which becomes more soft when heated and hard when cooled. Thermoplastic materials can be cooled and heated several times without any change in their chemistry or mechanical properties	ABS, Polyethylene, HIPS, PVS, polycarbonate, polypropylene
Thermoset plastics	polymer that irreversibly becomes rigid when heated.	Polyester resin, urea – formaldehyde, epoxy resin, phenol-formaldehyde.
Ceramics	A ceramic is an inorganic non-metallic solid made up of either metal or non-metal compounds that have been shaped and then hardened by heating to high temperatures.	Tungsten carbide, glass, ceramic bearing material
Composites	A composite material is a material made from two or more materials with significantly different physical or chemical properties that, when combined, produce a material with characteristics different from the original components	Glass reinforced plastic, Carbon fibre, concrete
Smart Materials	Smart materials, are designed materials that have one or more properties that can be significantly changed in a controlled fashion by external stress, moisture, electric or magnetic fields, light, temperature, pH, or chemical compounds	Shape memory alloys, thermochromic materials, Shape memory plastics, Quantum Tunnelling Composite.
Alloys	Alloying metals involves mixing two or more metals and other elements to improve their properties.	

High Carbon Steel

The hardest of the carbon steels. Less ductile, tough and malleable.


Uses - Chisels, hammers, drills, files, lathe tools, taps and dies



Cast Iron

Hard, brittle, strong, cheap, self-lubricating. Whitecast iron, grey cast iron, malleable cast iron.


Uses - Heavy crushing machinery. Car cylinder blocks, vices, machine tool parts, brake drums, machine handle and gear wheels, plumbing fittings.



Medium Carbon Steels

Stronger and harder than mild steels. Less ductile, tough and malleable.


Uses - Metal ropes, wire, garden tools, springs.



Aluminium

Greyish-White, soft, malleable, conductive to heat and electricity. It is corrosion resistant. It can be welded but this is difficult.


Uses - Aircraft, boats, window frames, saucepans, packaging and insulation, pistons and cranks.



Copper

Red, tough, ductile, High electrical conductor, corrosion resistant, Can work hard or cold. Needs frequent annealing.


Uses - Electrical wire, cables and conductors, water and central heating pipes and cylinders. Printed circuit boards, roofs.



Aluminium alloys

Ductile, Malleable, Work Hardens.


Uses - Aircraft and vehicle parts.



Brass

Very corrosive, yellow in colour, tarnishes very easily. Harder than copper. Good electrical conductor.


Uses - Castings, ornaments, valves, forgings.



Mild Steel

Tough, high tensile strength, ductile. *Because of low carbon content it can not be hardened and tempered. It must be case hardened.*


Uses - Girders, Plates, nuts and bolts, general purpose.



High Speed Steel

Can be hardened and tempered. Can be brittle. Retains hardness at high temperatures.


Uses - Cutting tools for lathes.



High Tensile Steel

Very strong and very tough.


Uses - Gears, shafts, engine parts.



Stainless Steel

Corrosion resistant

Uses - Kitchen draining boards. Pipes, cutlery, aircraft.



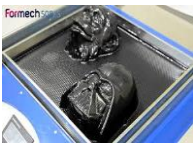
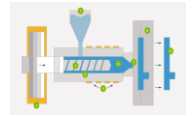
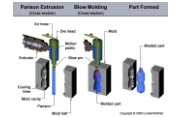

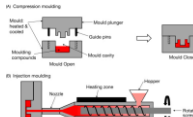
Properties of materials	
malleability	The ability of a material to permanently deform in all directions without cracking.
ductility	The ability of a material to deform, usually by stretching along its length.
conductivity/resistivity	The ability of a material to conduct heat or electrical energy. Opposite for resistivity
hardness	Resistance of a material to deformation, indentation, or penetration by means such as abrasion, drilling, impact, scratching
machinability	Machinability is a characteristic of a material, such as a metal, that makes it easy to drill, shape, cut, grind
corrosion resistance	How well a substance (especially a metal) can withstand damage caused by oxidization or other chemical reactions
elasticity/plasticity	The ability of a material to permanently change in shape.

Materials and uses	
Ferous and non ferrous metals and alloys	Used for cast iron machine bases, bronze for boat propellers, Copper used in wiring and circuit boards.
Thermoplastics	ABS for appliance casing
Thermoset Plastics	Phenol-formaldehyde for heat resistant saucepan handles.
Ceramics	Tungsten carbide for cutting tool tips)
Composites	Carbon fibre for bicycle frames
Smart materials	Shape memory alloy in alarm systems

Materials Testing Processes		
Destructive testing	is undertaken in order to understand a specimen's performance or material behaviour, these procedures are carried out to the test specimen's failure.	Tensile Testing, Hardness testing
Non Destructive Testing	is a testing and analysis technique used by industry to evaluate the properties of a material, component, structure or system for characteristic differences or welding defects and discontinuities without causing damage to the original part	Conductivity testing, Crack testing, Ultra Sonic Testing

Unit R109- Learning Objective 2

Engineering materials, processes and production

Plastic Moulding		
Vacuum forming		where a sheet of plastic is heated to a forming temperature, stretched onto a single-surface mold, and forced against the mold by a vacuum. This process can be used to form plastic into permanent objects
Injection moulding		lastic injection moulding is the process of melting plastic pellets (thermosetting/ thermoplastic polymers) that once malleable enough, are injected at pressure into a mould cavity, which fills and solidifies to produce the final product.
Blow moulding		Blow moulding is the process of forming a molten tube of thermoplastic material and placed within a mold cavity and inflating the tube with compressed air, to take the shape of the cavity and cool the part before removing from the mold.
Rotational moulding		Rotational Molding involves a heated hollow mold which is filled with a charge or shot weight of material. It is then slowly rotated, causing the softened material to disperse and stick to the walls of the mold.
Compression moulding		Compression moulding is the process of molding in which a preheated polymer is placed into an open, heated mold cavity. The mold is then closed with a top plug and compressed in order to have the material contact all areas of the mold.

Hand Forming	
Forging	Forging is a manufacturing process involving the shaping of a metal through hammering, pressing, or rolling. These compressive forces are delivered with a hammer or die.
Casting	liquid metal is poured into a mold that contains a hollow shape. The metal and mold are then cooled, and the metal part (the casting) is extracted.
Bending	Bending is a metal forming process in which a force is applied to a piece of sheet metal, causing it to bend at an angle and form the desired shape.

Joining Methods	
Welding	Welding is a joining process whereby two or more parts are united by means of heat or pressure or both.
Riveting	When installed the rivet is either drilled, placed or punched into a hole, afterwards the tail is then deformed, holding the rivet in place. The rivet is deformed by of the tail, which makes the material flatter and usually causes the tail to be expanded by about one and a half times the size of the stem's original diameter.
Soldering	Soldering is a process in which two or more items are joined together by melting and putting a filler metal into the joint,
Brazing	Brazing is a metal-joining process in which two or more metal items are joined together by melting and flowing a filler metal into the joint,
Threaded Fasteners	A threaded fastener is a discrete piece of hardware that has internal or external screw threads. hey are usually used for the assembly of multiple parts and facilitate disassembly. The most common types are the screw, nut and bolt.
Self Tapping Screws	A self-tapping screw is a screw that can tap its own hole as it is driven into the material

Heat Treatment	
Hardening and Tempering	Hardening is the process of increasing the hardness of the material by heating and then quickly cooling. Tempering is the heating process to a temperature below is critical range, holding and then cooling
Case Hardening	Case-hardening or surface hardening is the process of hardening the surface of a metal object while allowing the metal deeper underneath to remain soft
Normalising	Normalising is the process of heating a material to a temperature above a critical limit and then cooling in open air.
Nitriding	Nitriding is a heat treating process that diffuses nitrogen into the surface of a metal to create a case-hardened surface. These processes are most commonly used on low-carbon, low-alloy steels.

Material Removal	
Sawing	A saw is a tool consisting of a tough blade, wire, or chain with a hard toothed edge. It is used to cut through material,
Filing	Filing is a material removal process in manufacturing.
Threading	Threading is the process of creating a screw thread.

Year 11 Engineering Manufacture R109

"If you believe you can achieve!"

Unit R109- Learning Objective 3

Applications of computer controlled production processes

Automation

Processes or procedures performed without human assistance.

Impacts:

- Increased output, faster to market.
- Zero defects, better quality.
- Smaller workforce, retraining, better conditions.
- Initial capital outlay, workforce savings, reduced production costs.

Robotics

Handle materials and products, for loading and unloading, pick-and-place assembly. Typically, a programmed arm with an effector.

ADVANTAGES

- Use in hazardous environments
- Highly repetitive tasks
- Lower labour costs
- Accurate

DISADVANTAGES

- Limited abilities
- Cannot complete tasks needing sensory feedback or judgement

Digital Communications

Aid the manufacturing process.

- Barcodes

Small blocks of alternating white and black lines scanned with a red laser. Used to track products and update stock databases. Can be linked to automatic ordering systems and stock control.

- RFID Tags

Microchips with an induction coil to receive energy. Microchip stores data, so acts like an 'Intelligent Barcode'. Used for the same things as barcodes, scanned with an RFID reader.

- Stock Control Systems

Monitor stock levels using sensors and database information (which is updated using barcodes and computers). Can order items when stock is running low, to maintain supplies.

- Computer Aided Design

Digital files and use of standards allow drawings to be distributed across the world. Makes design process easier, and less risk of error in Global Manufacturing operations.

CNC

Traditional style machines adapted to have some/all axes computer controlled.

ADVANTAGES

- Precise
- Accurate
- Repeatable
- High productivity
- Optimum cutter use (tool racks)/environment

DISADVANTAGES

- Higher initial purchase cost
- Jobs lost
- Programmer needed

Automated Guided Vehicles

Small vehicles to move stock, or function as mobile workstations, along pre-set routes. Use cables in the floor to navigate by magnetic induction.

Flexible Manufacturing System

Integration of technologies, incorporating computer managed systems. Extremely versatile.

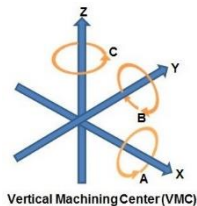
ADVANTAGES

- Increased output
- Reduced times
- Consistency
- Right-First-Time
- Reduced cost
- Improved working conditions
- Smaller workforce

DISADVANTAGES

- High investment costs
- Needs programming
- Vulnerable if a cell fails
- Job loss
- Re-training costs

CNC (computer numerical control) machining is a process in manufacturing where programmed computer software directs the motions of plant machinery and tools. ... These machines have at least a 3 **axes** and operate along an XYZ plane: **X axis** (vertical), **Y axis** (horizontal), and a **Z axis** (depth)



Year 11 Engineering Manufacture R109

"If you believe you can achieve!"

Unit R109- Learning Objective 3

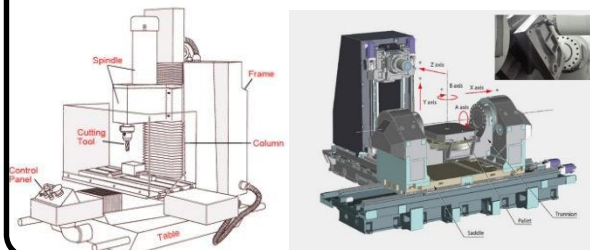
Computer Numerical Control (CNC) machining processes

CNC lathes

- Used to produce cylindrical objects.
- Materials are held in a chuck and rotated at different speeds.
- The cutting tool is held in the tool post and is inserted into the material as it rotates. It moves in the X and Y axis.
- The final shape of the material depends on the path taken by the cutting tool.

CNC Milling

- Uses a rotating cutting tool to shape a range of metals and plastics.
- The work is clamped to a bed which moves in the X and Y direction.
- The cutting tool is placed in a chuck connected to a rotating spindle.
- The spindle moves in the Z direction.

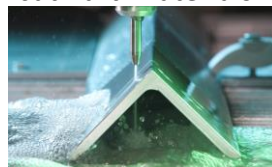


Multiaxis machining

A manufacturing process that involves tools that move in 4 or more directions and are used to manufacture parts out of metal or other materials by milling away excess material.

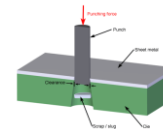
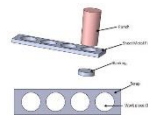
A water jet cutter

Also known as a water jet or waterjet, is an industrial tool capable of cutting a wide variety of materials using a very high-pressure jet of water, or a mixture of water and an abrasive substance. The term abrasive jet refers specifically to the use of a mixture of water and abrasive to cut hard materials



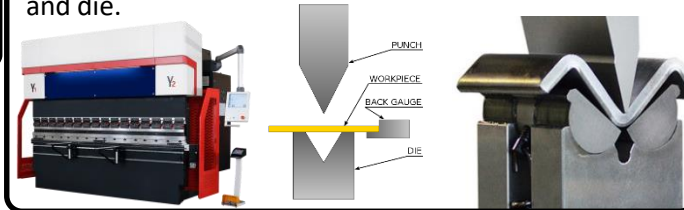
Punching machines

A punching machine is a machine tool for punching and embossing flat sheet materials to produce form-features needed as mechanical element and/or to extend static stability of a sheet section.



Press brake machines

A press brake is a machine pressing tool for bending sheet and plate material, most commonly sheet metal. It forms predetermined bends by clamping the work piece between a matching punch and die.



Laser cutting

Laser Cutting is a non-contact process which utilizes a laser to cut materials, resulting in high quality, dimensionally accurate cuts. The process works by directing the laser beam through a nozzle to the work piece. A combination of heat and pressure creates the cutting action.

Additive manufacturing and rapid prototyping processes

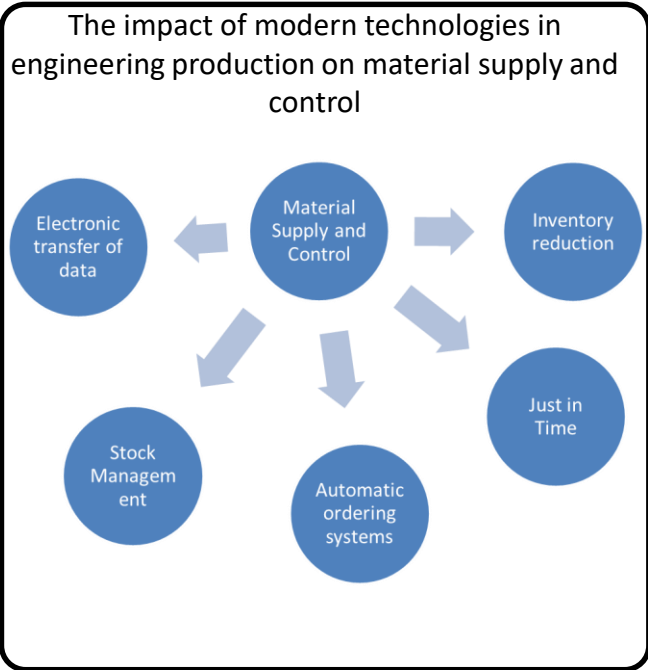
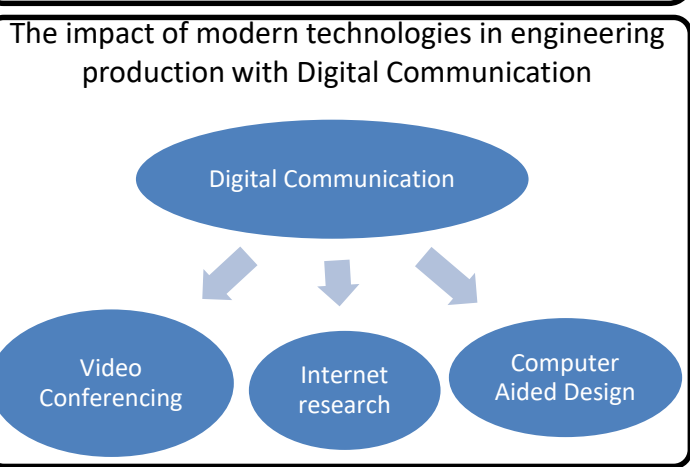
- Direct Metal Laser Sintering (DMLS)
- Selective Laser Sintering (SLS)
- Stereolithography (SLA)
- Fused Deposition Modelling (FDM)/3D printing; electron beam melting)

3D printing process that uses a continuous filament of a thermoplastic material. Filament is fed from a large coil through a moving, heated printer extruder head, and is deposited on the growing work. The print head is moved under computer control to define the printed shape.

Unit R109- Learning Objective 4

Understand the impact of modern technologies on engineering production

The impact of modern technologies in engineering production; AUTOMATION	
Output	<ul style="list-style-type: none">Increased output productionGoods are faster to marketReduction in production times
Quality	<ul style="list-style-type: none">Improvement in consistency of goodsGoods produced with no defectsGoods are produced right first time
Workforce	<ul style="list-style-type: none">With machinery doing the work, you only need a smaller workforceYou need to re train staff to be able to use the new machineryImprovement in working conditions.
Costs	<ul style="list-style-type: none">Large initial cost purchasing equipment.Reduction in workforce costs due to decrease in employeesReduction of overall cost of production



Global Manufacturing	
The exporting of tasks to other countries, due to skill availability and proximity to materials. Standardised processes and procedures.	
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Financial incentivesLower costsClose to raw materialsEased by digital commsExchange rate benefitsClose to developing marketsMade to international standards	<ul style="list-style-type: none">High investment costRequires high volumePotential for disaster – economic, environmental, social.

Just-In-Time	
Strategic supply of materials in an organised way, providing them just when needed.	
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">No overproductionNo stock build upStreamlines productionReduces cost and production timeLimits TIMWOOD waste	<ul style="list-style-type: none">Stock may arrive lateLeaves production haltedNo stock for emergenciesDelays/disasters mean lost money

Automatic Ordering	
Captures customers requests, sends information to accounting/ shipping/ manufacturing departments. Tracked stock arrives when needed.	
ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none">Makes orders more reliableCustomer satisfaction increasesReduces errorsMaximises profitabilityRuns on-time	<ul style="list-style-type: none">Needs to be flexibleExpensive

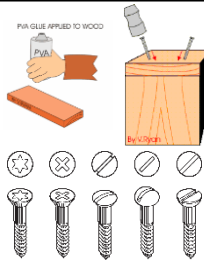
DESIGN AND TECHNOLOGY

Manufacturing Aids

Screws - Screws are temporary and can be removed.

P.V.A. (Polyvinyl Acetate) Glue - These are very popular as they do not need preparation. These glues are permanent fixing methods.

Nails - Nails are permanent and when removed ruin the materials. They can also be used with PVA for a stronger join. Without PVA they can work loose.



QC Quality Control

To check how well made a product is at a specific stage in its manufacture against success criteria

QA Quality assurance

To check the quality of tools, equipment and materials. Before, during and after a products manufacturing process.

Manufacturing Aids

- **Formers:** A construction used to help with shaping operations e.g. laminating, vacuum forming, acrylic bending, felt blocking, dressmaker's dummy, drop moulding.
- **Jigs:** A device you line material up to accurately repeat an operation accurately time after time e.g. for sawing, cutting, drilling, punching. Jigs are lined up and left on the material while you perform the appropriate making stage.
- **Templates:** A shape made from a durable material which can be lined up and drawn/cut around to reproduce the original shape e.g. dress pattern, cake decoration, sheet metalwork, block pattern.

Tools and Equipment:

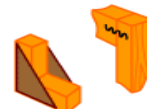
Tenon saw, coping saw, plane, chisel, marking gauge, try square, glass paper, emery cloth, pillar drill, disc sander, hand sander, hand vice, g-clamp, mallet, bench hook.

Frame joints

Strong, permanent and neat-looking joints in timber are achieved using one of the many types of **frame joint**. Frame joints are right-angled jointed frames common in furniture, boxes and many other types of assembly.

Simple frame joints

Some simple frame joints



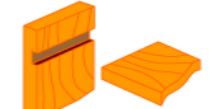
Butt joint



Dowelled joint



Corner halving



Through housing joint

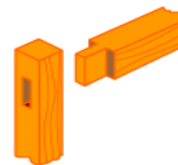
The simplest frame joint is a **butt joint**. It is easy to make, but weak. You can strengthen a butt joint by fixing a reinforcing plate over the joint.

A butt joint can also be strengthened by gluing dowel into both parts - making a **dowelled joint**. Dowelled joints are good for joining man-made boards (modified timbers) which might split easily if screwed or nailed.

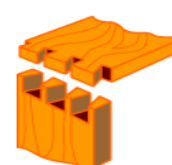
Corner halving joints are stronger than butt joints, as there is more contact for gluing, and the **shoulder** gives extra mechanical strength. **Through housing joints** are used for shelves.

More complex frame joints

More complex frame joints



Mortise and tenon



Dovetail joint



Comb/box joint

Mortise and tenon joints are very strong, because of the shoulders. If your joint is close to the end of a piece of wood, use a **haunched** mortise and tenon joint.

Dovetail joints are very strong and look good - but are complex and difficult to cut. They are often used in high-quality furniture.

Comb or box joints are easier to make and offer good contact for gluing. They are often used in wooden boxes.

WHAT ARE SOFTWOODS ?

Softwoods are from trees that have needles / exposed seeds, not leaves. They grow quickly, compared to most hardwoods. When sawn and planed they tend to be light/pale in colour. Softwoods also tend to be cheaper than hardwoods.



Softwoods are used by the construction industry and are used to produce paper pulp, and card products.

SOFTWOODS 1 PARANA PINE

Virtually knot free with straight grain, making it ideal for a range of uses. Light brown. Very easy to cut and shape, meaning accurate work is easier to achieve than with most softwoods and hardwoods. A smooth finish can be achieved.

Used in the manufacture of furniture. Often used for turning wood products. Used to manufacture plywood.

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SOFTWOODS 2 SCOTS PINE

Sometimes called Red Deal. A popular natural wood. Can be resinous and have plenty of knots. Coloured from light yellow to dark brown. Can be shaped and formed reasonably easily by handtools and machines.



Often used for furniture and the construction industry. Used for interior work. One of the most commonly used woods.

SOFTWOODS 3 RED CEDAR

Has a pleasant aroma, when cut and machined. Its straight grain means that it works well with tools and machines. Starts as reddish brown in colour, after weathering turns to a silver grey.



Used for decking, furniture and general construction. Used for roof shingles, due to its resistance to all weathers.

SOFTWOODS 4 YEW

Straight grained which means it can be shaped and formed quite easily. However, the grain can sometimes be difficult to work. An oily wood that resists natural degradation from the weather and elements.



Used to manufacture both interior and exterior furniture e.g. chairs, gate posts and wood turning.

SOFTWOODS 5 DOUGLAS FIR

A reddish brown wood and relatively knot free. Good to work with handtools and machinery. When smoothed to a fine finish, the grain tends to stand out from the surface.



Used extensively in the construction industry and in the production of plywood. Also used in a range of joinery work.

SOFTWOODS 6 SEQUOIA

A reddish to brown wood with a texture that varies from smooth to coarse. Can be worked quite easily with handtools and machines. Glass paper produces a good, smooth finish.



Used regularly as roof shingles, due to its resistance to the weather. Used for interior and exterior joinery.

SOFTWOODS 7 LARCH

High in resin and straight grained. Pale red to brick red. Can be worked reasonably well with handtools, if knots are avoided.



It is a tough softwood and has a range of uses including: boat planking, window frames, floors and staircases.

WHAT ARE HARDWOODS ?

Sometimes called broad-leaf trees. Lose their leaves seasonally, in winter. Hardwoods tend to be harder than softwoods (with the exception of Balsa Wood). They have a wider variety of colour and texture than softwoods. Hard woods tend to be more expensive than softwoods and take longer to mature.



HARDWOODS 1 EUROPEAN OAK



Light tan in colour and straight grained. High quality timber.

Moderately hard to work with handtools. Tools should be kept sharp. Produces a high quality finish with wax, furniture oil and varnish.

Uses include: quality furniture, cabinet making and boat building.

HARDWOODS 2 EUROPEAN WALNUT



Grey to brown colour with relatively straight grain. Excellent timber.

Tough and can be worked reasonably easily with hand tools. Easy to carve and can be smoothed to a highly polished finish.

Used in solid and veneer form for high-class furniture, cabinet making, bank and office fittings.

HARDWOODS 3 BALSA



Unlike most hardwoods. Fast growing. Reaches maturity in just five to seven years.

Very soft and easy to work with tools. Pale in colour and extremely light to carry/transport.

Extremely popular as a material for model making. Also used occasionally to package delicate items.

HARDWOODS 4 EUROPEAN ASH



Colour - cream to pale tan. Tough, flexible and straight grained, very good steam bending qualities. Can be shaped and formed well with handtools. A smooth finish can be achieved and stains well.



Used for cabinet making, boats and handles of tools. Ash veneered plywood is popular.

HARDWOODS 5 BRAZILIAN MAHOGANY

Medium to dark brown in colour. Relatively easy to work with hand tools and machinery. Produces a good quality finish with glass paper. Takes varnish well.



Wide range of uses including furniture and boat building. Used widely as veneer.

HARDWOODS 6 ENGLISH ELM



Light brown / pale brown in colour. Can be difficult to work with handtools, due to awkward grain. Can be worked to a fine finish. Looks particularly good with a waxed finish.



Used in cabinet making, turns quite well and is used as veneer, to provide a quality finish on cheaper woods.

HARDWOODS 7 EUROPEAN BEECH



Pale white to pink brown in colour. Very good for steam bending. It can be worked reasonably well with handtools and machinery.



Used for quality furniture, handles, manufacturing chairs and good for wood turning. Often used as a facing for plywood.



BLOCKBOARD - This is built up with a core of softwood strips bonded together with adhesive and covered with a sheet of plywood on either side. Used as a building material and for furniture manufacture including fitted kitchens / bedrooms.



CHIPBOARD - This is made up of small chips of wood bonded together with resin and formed into sheets by compression. It is not as strong as plywood and block board but it is not expensive. Chipboard is often covered with a plastic laminate or wood veneer and used in furniture.



HARDBOARD - This is made from wood fibres that have been pulped. The pulp is put under pressure until the fibres bond to produce a tough board that is smooth on one side and rough on the other. It is not as strong as the other boards.



MEDIUM DENSITY FIBRE BOARD (MDF) - A quality board, relatively cheap. This board is composed of fine wood dust and resin pressed into a board. This material can be worked, shaped and machined easily. Paint can be applied to it without the need for an undercoat or primer. Used in the building and furniture trades.



PLYWOOD - This is made from veneers (plies) of timber with each grain layer being at right angles to each other and bonded together by resin and pressure. A number of grades are available, designed to suit a variety of situations.

1. Marine plywood that is moisture resistant.
2. Weather and boil proof plywood.
3. Boil resistant plywood.
4. Interior plywood.

Ergonomics:

- The **application/use** of **anthropometric data** in **real situations**.
- A study of the **relationship between people** and their **environments**.
- The **design of efficient layouts** and **workspaces**.

Anthropometrics:

- Study of **peoples** or **human size**.
- Anthropometric data makes use of the **5th to 95th percentile**.
- Involves **measuring** people.
- Anthropometric data is measurements.

Scales of Production

One off – Individual products made one at a time.

Batch – A group of products made at one. Around 2-2000.

Mass – High volume production 100,000s of products made at once.

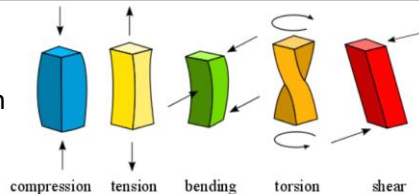
Continuous – Non stop production of products along a fully automated system.

What are the advantages of flat-pack furniture:

- Affordability
- Easy transportation
- Compactness
- Choice of colours, design and size
- Eco- friendly and sustainable solution

Forces:

Tension
Compression
Shear
Bending
Torsion

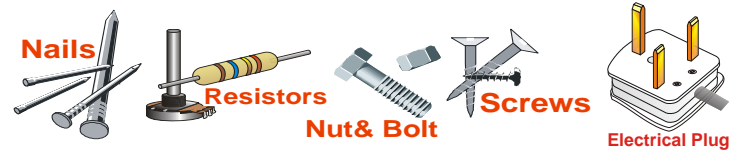


Sustainable Design

- Reuse - Use the packaging again e.g. plastic carrier bag
- Recycle - Reprocess the materials from used products to be used to make new products.
- Reduce - Reduce the amount of raw materials used.
- Rethink - Rethink the design of products to minimise use of non renewable resources.
- Repair - Repair and maintain products rather than replace
- Refuse – Refuse non essential products.
- Carbon Footprint and Lifecycle – Measuring a products impact on the environment throughout it production and use.

Standard Components

- Ready-made standard components can be found in many products
- It is usually cheaper to manufacture these in large quantities in specialist factories rather than for each manufacturer to make their own
- Repairs are much easier when standard components are used



Modelling and developing your designs can be used to test out a variety of aspects about your designs such as:

- Function and ergonomics – Does it work as intended?
- Anthropometrics and size – Is it the right size? 5th to 95th percentile.
- Aesthetics and style – How does it look?
- Most modelling is completed using easy to cut and shape materials such as Balsa wood, blue foam, foam core board and cardboard.

Stock Forms

Timber: Sheet, PSE, RSE, plank

Materials are sold in their stock forms for a number of reasons.

- It is how the consumer wants the material to be.
- It is easier to use it in the stock form.
- It is easier to transport the material in its stock form.
- It is easier to store the material in its stock form.