Dorset Studio School
CENTRE OF EXCELLENCE FOR ENVIRONMENTAL SCIENCES

Knowledge Organiser Booklet

Year 9 Autumn Half Term 2

Name:_____ Tutor group:_____

Contents

Education Endowment Foundation

+5 months

Research carried out by the Education Endowment Foundation proved that: Homework has a positive impact on average of + 5 months, particularly with pupils in secondary schools.

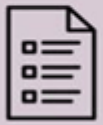
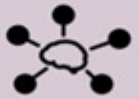
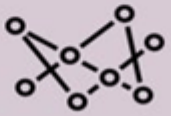
Home learning timetable

The table below details which days each subject will set home learning on each week. Students will have one week to complete home learning tasks for each subject.

Group	Monday	Tuesday	Wednesday	Thursday	Friday
9N	Humanities Physics	Chemistry English	Land based Animal Care	Maths Biology	
9E	English	Chemistry Physics	Land based	Maths Humanities	Biology Animal Care
9W	Humanities L & E	English Biology	Animal Care	Maths Physics	Chemistry

These knowledge organisers have been created by your teachers to support your learning both in class and for home learning. They are also a valuable revision tool for you to use independently when preparing for assessments. It is important that you make good use of your knowledge organisers by learning how to use them in different ways.

How to use a knowledge organiser – step by step guide

	Look, Cover, Write, Check	Definitions of Key Words	Flash Cards	Self Quizzing	Mind Maps	Paired Retrieval
Step 1	Look at and study a specific area of your KO. 	Write down the key words and definitions. 	Use your KO to condense and write down key facts or information onto flash cards. 	Use your KO to create a mini quiz. Write down your questions using your KO. 	Create a mind map with all the information you can remember from your KO. 	Ask a friend or family member to have the KO or flash cards in their hands. 
Step 2	Cover or flip the KO over and write down everything you can remember. 	Try not to use your KO to help you. 	Add pictures to help support. Then self-quiz using the flash cards. You could write questions on one side, and answers on the other! 	Answer the questions and remember to use full sentences. 	Check your KO to see if there are any mistakes on your mind map. 	They can test you by asking you questions on different sections of your KO. 
Step 3	Check what you have written down. Correct any mistakes in green pen and add anything you have missed. Repeat. 	Use your green pen to check your work. 	Ask a friend or family member to quiz you on the knowledge. 	Ask a friend or family member to quiz you using the questions. 	Try to make connections, linking the information together. 	Write down your answers, 

Dr Jekyll and Mr Hyde

Year 9 English: Autumn 2

Context

On The Origin Of Species –Charles Darwin introduced the scientific theory that populations evolve over the course of generations through a process of natural selection. Darwin put forward the theory that all life, including humans, was evolved from more primitive forms. This was shocking to a Victorian society which were extremely religious and raised many questions about science and religion.

Duality - Closely linked to the Victorians' increasing sense of the conflict between science and religion was the idea that humans have a dual nature.

On the one hand, they saw the calm, rational, everyday normality of family life and employment; on the other, fantasies, nightmares, anger and violence. Many gentlemen appeared respectable in society but secretly committed sins.

The Gothic - Gothic literature evokes an atmosphere of mystery, fear or terror. The gothic genre was really popular during the 1800s with Frankenstein, Wuthering Heights and Dracula.

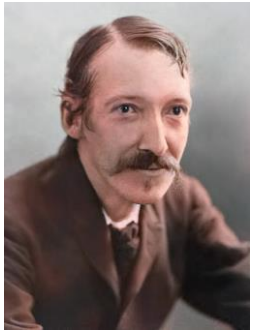
SCAN ME

Did you know...

Robert Louis Stevenson moved to Bournemouth in 1884, living there with his wife between 1884 and 1887.

While he was living in Westbourne, he wrote his **Gothic novel** '*Strange Case of Dr Jekyll and Mr Hyde*', published in 1886, with the character Mr Poole named after the neighbouring town. After years of ill health, he left Bournemouth in 1887.

SCAN ME



Methods

Foils – characters that are opposite to exaggerate contrasting qualities

Motif – a recurring image or idea through out a text

Simile – compares two objects using like or as

Listing – used to over emphasise or exaggerate

Light Imagery - use of images of light and darkness to emphasize deeper meanings and emotions

Animal imagery

Juxtaposition – deliberate placing of contrasting ideas or images (wealth & poverty, good & evil)

Pathetic fallacy – personification of the weather. Reflects the mood or emotions of the characters

Symbolism – using symbols, images or ideas to represent qualities

Zoomorphism – giving humans animal like qualities usually to dehumanise them or make them seem monstrous.

Themes

Scientific development – Dr. Jekyll arrives at Hyde through his unethical and secretive experimentation

Reputation – Henry Jekyll is intelligent, well respected and educated but finds himself bored by his Victorian obligations

Good vs evil and the duality of human nature – The novel show sthat the evil in our nature, if given a little nourishment and attention, might grow into an uncontrollable monster

The supernatural - Stevenson shows the binary opposites of the natural and the supernatural

Plot Summary

Utterson hears the story of how Hyde, Jekyll's friend, trampled on a girl.

Utterson meets Hyde and is shocked. He wonders why his respectable friend could befriend such a person.

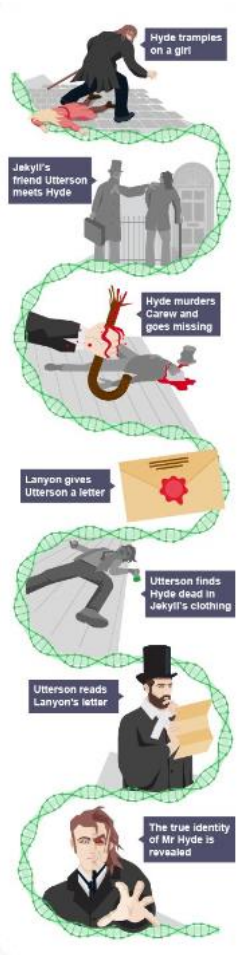
A year later, Carew is murdered by Hyde. Jekyll is deeply affected by this and refuses to speak to anybody. Hyde goes missing.

Utterson goes to speak to Lanyon because he is concerned about Jekyll. Lanyon refuses to speak about Jekyll and hands Utterson a letter that must only be opened at the disappearance or death of Jekyll.

In the middle of the night, Utterson is summoned to Jekyll's house where he breaks down the laboratory door and discovers a dead man. Utterson reads Jekyll's newly amended will and takes Jekyll's confession to read at home.

As Jekyll has disappeared, Utterson reads Dr Lanyon's letter which tells him the true nature of Jekyll's experiments.

Utterson reads Jekyll's confession which reveals the true identity of Mr Hyde



SCAN ME

Key Terms

Gothic Genre	Writing that is characterised by the inclusion of dark, supernatural elements, both in terms of occurrences and the setting
Themes	A central idea that is explored and expressed throughout a text
Allegory	A narrative story that conveys a complex, abstract, or often political message
Omniscient Narrator	An 'all-knowing' kind of narrator. They have full knowledge of the story's events and of the motives and unspoken thoughts of the various characters

Key Quotes

'There is something wrong with his appearance; something displeasing, something downright detestable'.– Chapter 1

'unscientific balderdash'. 'snarled into a savage laugh' Chapter 2

'all intelligent reputable men, and all judges of good wine' Chapter 3

'ape-like fury' Chapter 4

dingy windowless structure ' Chapter 5

"man is not truly one, but truly two" Chapter 10

My devil had long been caged, he came out roaring' Chapter 10

What you need to know: Rounding and Truncation to state error intervals

The upper and lower bound come from the largest and smallest values that would **round** to a particular number.

Take 'half a unit above and half a unit below'. For example rounded to 1 d.p means nearest 0.1, so add 0.05 and subtract 0.05 to get the bounds.

All error intervals look the same like this:

$$\leq x <$$

The lowest value a number could have been is the lower bound.
The highest value a number could have been is the upper bound.

E.g. 1 State the upper and lower bound of 360 when it has been **rounded** to 2 significant figures:
2 significant figures is the nearest 10, so 'half this' to get 5, and add on to 360 and take it off 360,

$$355 \leq x < 365$$

Note: You should know it could be 364.9999… but we write 365 as the upper bound for ease of calculations.

E.g. 2 **Truncation:** State the error interval of 4.5 when it has been **truncated** to 1decimal place. This means it has been 'chopped off'. The lowest value it could have been is 4.5, thehighest is 4.59999… so in an error interval

$$4.45 \leq x < 4.55$$

Key Terms:

- Bound
- Upper
- Lower
- Accuracy
- Rounding
- 'to the nearest'
- Truncation
- Suitable degree of accuracy- choose a suitable rounding e.g. 2.d.p as your reason

Key Facts:

Rounding a number and **truncating** are different things.

Truncation comes from the word *truncare*, meaning "to shorten," and can be traced back to the Latin word for the trunk of a tree, which is *truncus*.

3.14159265… can be truncated to 3.1415 (note that if it had been rounded, it would become 3.1416).

A question may ask for the error interval for **rounding** or **truncation** – take care to read the question!

Topic/Skill	Definition/Tips	Example
1. Inverse	Opposite	The inverse of addition is subtraction. The inverse of multiplication is division.
2. Rearranging Formulae	Use inverse operations on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of
3. Writing Formulae	**Substitute letters for words** in the question.	Bob charges £3 per window and a £5 call out charge. $C = 3N + 5$ Where N=number of windows and C=cost
4. Substitution	**Replace letters with numbers**. Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2$ *and* $c = 5$. Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
5. Using real life formulae	**Using scientific formulae**	Change the subject and substitute values into formulae such as: F = ma, E = mc^2, P = F/a, V = IR, S = d/t, P = E/t

Ratio

Simplifying ratio:
12:8
Find the highest common factor:
4
Divide both by this number.
12:8
÷4
3:2

Sharing in a ratio:
Share £12 in the ratio 2:1
How many part are there in total?
2 + 1 = 3
How much is each share worth?

$$12 \div 3 = 4$$

Given how many shares each person has, how much money should they get?
2:1

× 4

£8:£4

Proportion

Direct proportion:

A cake recipe for 4 people uses:
400g flour
400g sugar
3 eggs

How much of each would you need if you were baking for 8 people?
$8 \div 4 = 2$

$$2 \times 400 = 800g\ flour$$
$$2 \times 400 = 800g\ \text{sugar}$$
$$2 \times 3 = 6\ eggs$$

In direct proportion:

A house takes 4 people 2 days to paint house.
How long would it take 2 people to paint the same house?

Units

Use the following information to convert between metric units:

1Kg = 1000g
1L = 1000ml
1m = 100cm
1m = 1000mm
1m = 100cm

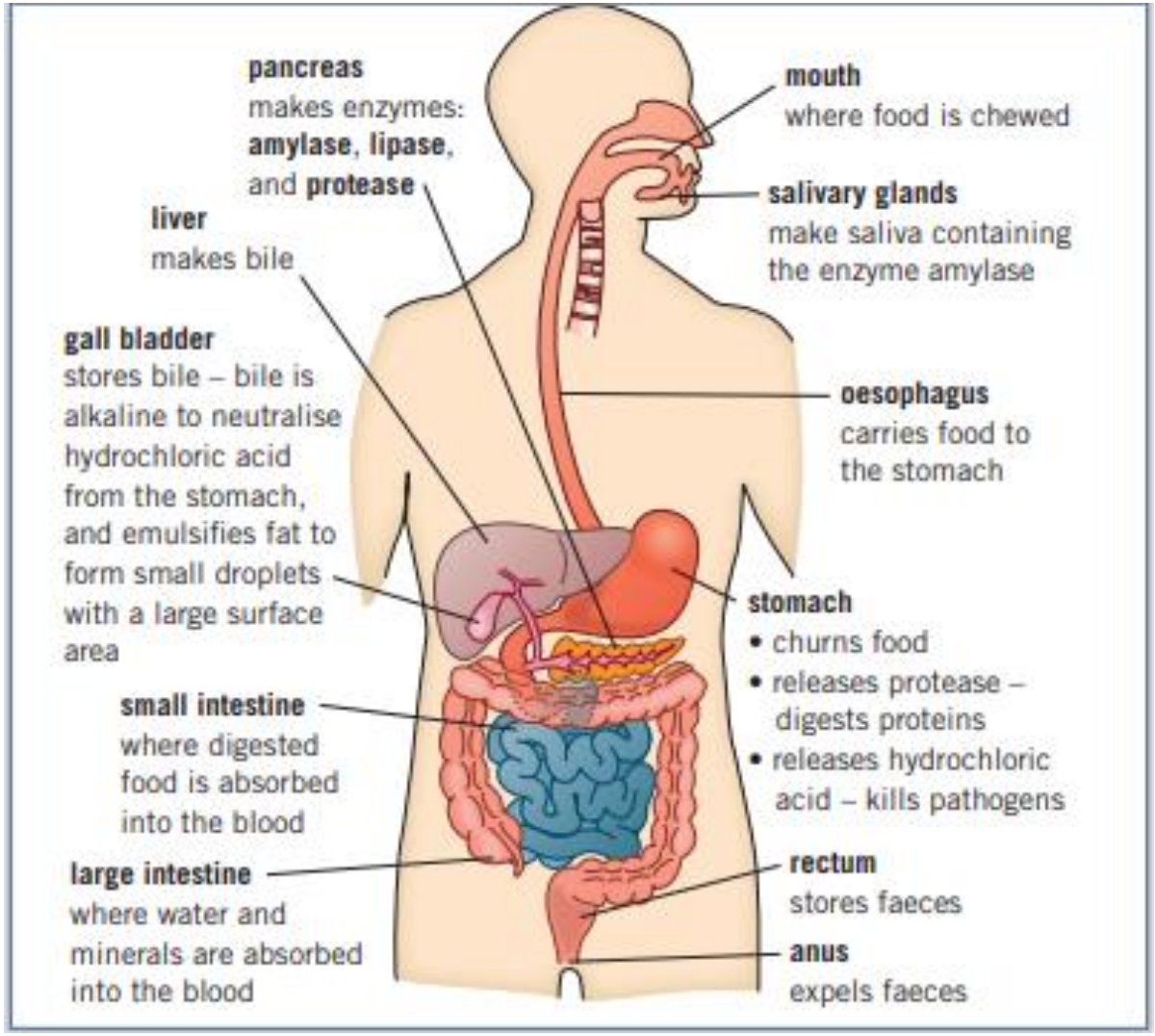
Use the following information to convert between metric and imperial units:

1mile = 1.6km

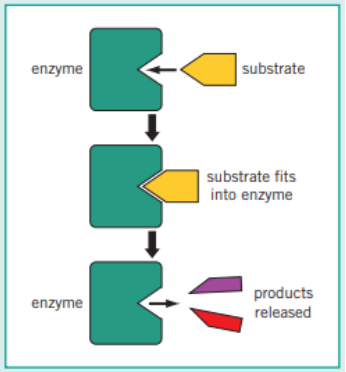
1inch = 2.5cm

1Kg = 2.2lb

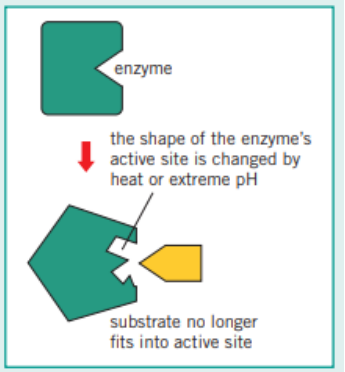
Cells → Tissue (similar cells) → Organs (tissues working together) → Organ systems (organs working together) → Organisms



Enzymes are large proteins. They are biological catalysts that speed up reactions without getting used up.
Digestive enzymes convert large insoluble molecules into small soluble molecules.



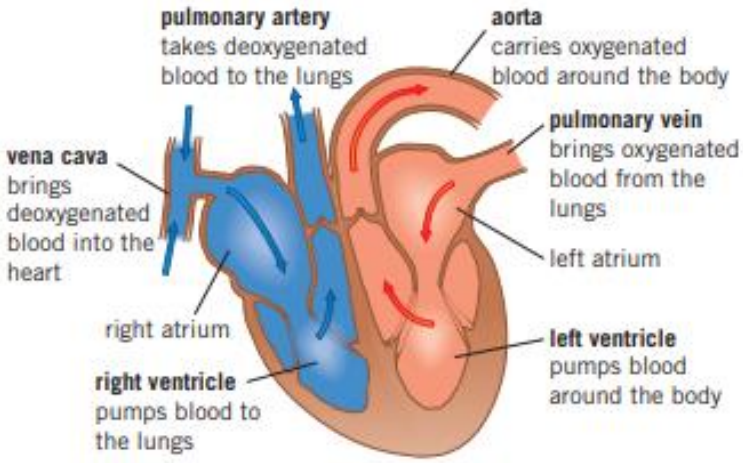
Amylase – made in the salivary gland, pancreas, small intestine – converts starch to glucose.
Protease – made in the stomach, pancreas, small intestine – converts proteins to amino acids
Lipase – made in the pancreas, small intestine – converts lipids to fatty acids and glycerol



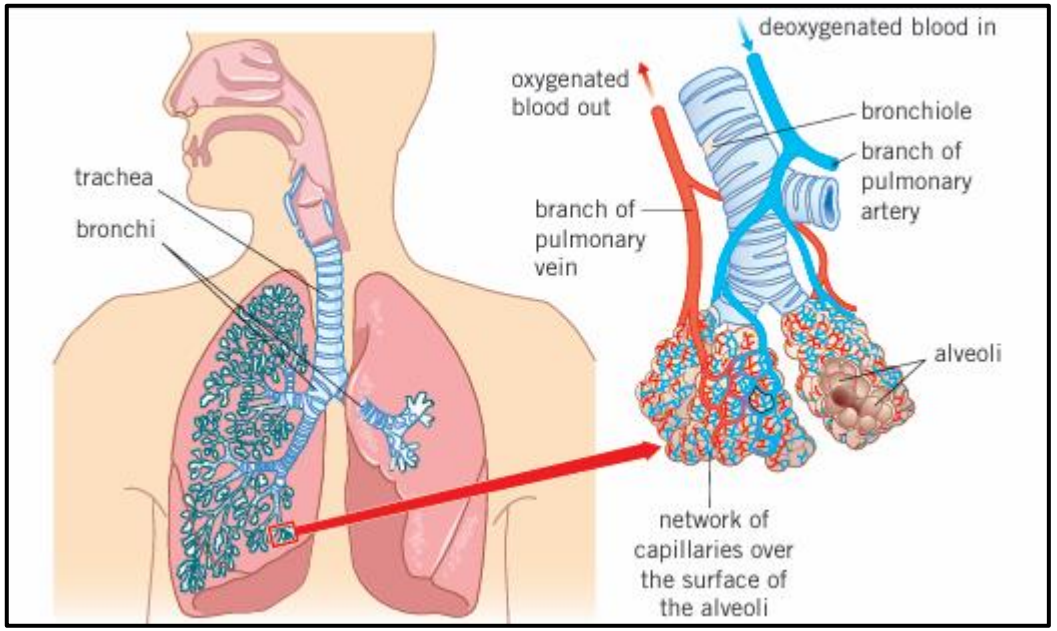
Denaturing Enzymes
At the wrong pH or temperature the **shape** of the **active site** changes.

Different enzymes have different **optimum** pH and temperature values.

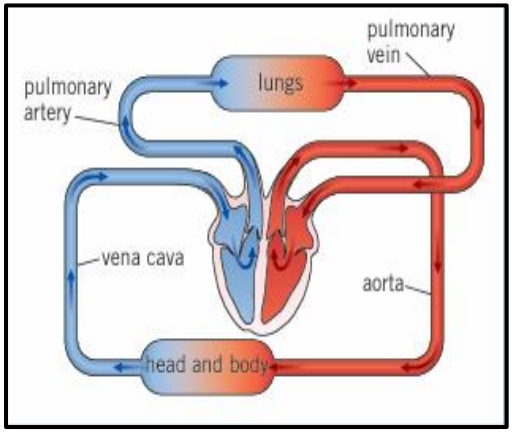
The **heart** is made of **cardiac** muscle. It is supplied with oxygen by the **coronary artery. Heart rate** is controlled by **pace-maker cells** in the right atrium.
Humans have a **double circulatory system.** The blood passes through the heart twice.



Inhale = Breath in : Trachea → Bronchi → Bronchioles → Alveoli
Air we inhale has 21% oxygen, very little carbon dioxide or water vapour.
Air we exhale has 16% oxygen, 4% carbon dioxide and 1% water vapour



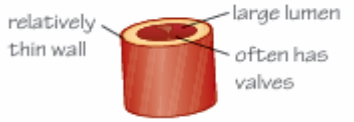
Red blood cells carry oxygen
Plasma (liquid) transports substances
Platelets forms blood clots
White blood cells defend the body



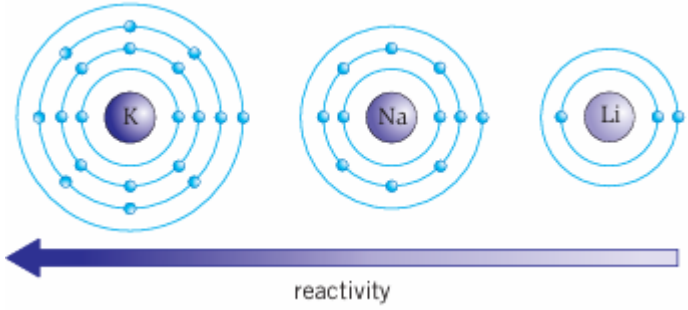
Capillary – connects arteries and veins. Very narrow lumen. Walls are one cell thick – short diffusion distance.

Artery – away from the heart

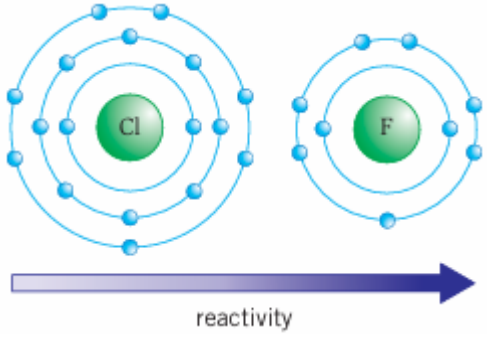
Vein – towards the heart



Group 1 – Alkali Metals – react with water to form a hydroxide (alkali).
Metal + Oxygen → Metal oxide
Metal + Chlorine → Metal chloride
Metal + Water → Metal hydroxide + Hydrogen
All have **one electron** in their **outer shell**.
Reactivity increases down Group 1 because as you move down the group:
- the atoms increase in size
- the outer electron is further away from the nucleus, and there are more shells shielding the outer electron from the nucleus
- the electrostatic attraction between the nucleus and the outer electron is weaker so it is **easier to lose the one outer electron**.



Group 7 – Halogens – non-metals
Fluorine and chlorine are diatomic gases.
Bromine is a liquid at room temperature.
Iodine is a solid.
Reactivity decreases down Group 7 because as you move down the group:
- the atoms increase in size
- the outer shell is further away from the nucleus, and there are more shells between the nucleus and the outer shell
- the electrostatic attraction from the nucleus to the outer shell is weaker so it is **harder to gain one electron to fill the outer shell**.



Group 0 – Noble Gases
They have a **full outer shell** of electrons, so do not need to lose or gain electrons.
Are very unreactive (inert) so exist as single atoms.
They have **boiling points** that **increase down** the group.

Early Periodic Table
- By atomic mass
- No gaps
- Elements not grouped

Mendeleev's Periodic Table
- By atomic mass with some swapped around
- Gaps for undiscovered elements
- Elements grouped by chemical properties

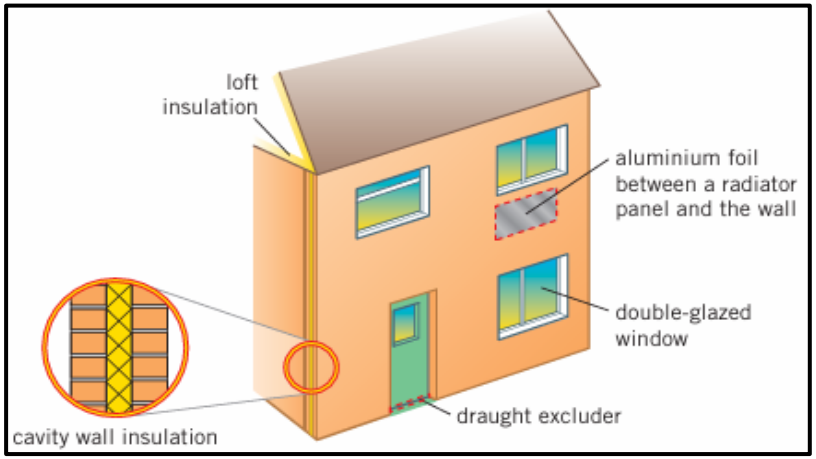
Modern Periodic Table
- By atomic number
- No gaps
- Grouped by the number of electrons in the outer shell.

Gas Pressure – is caused by the force of the gas particles hitting the surfaces of the container.

The particles are moving in **random** directions and with **random** speeds. **Temperature** is related to the **average kinetic energy** of the particles. Increasing the **temperature** increases the pressure because the particles are moving faster and they hit the surfaces harder and more frequently.

When a gas is **compressed quickly** its **temperature increases** because **work is done** by the compressing force.

Work done (J) = Energy input (J) = Force (N) x Distance moved (m)



Internal Energy - the sum of the total kinetic energy the particles have due to their motion and the total potential energy the particles have due to their positions relative to each other.

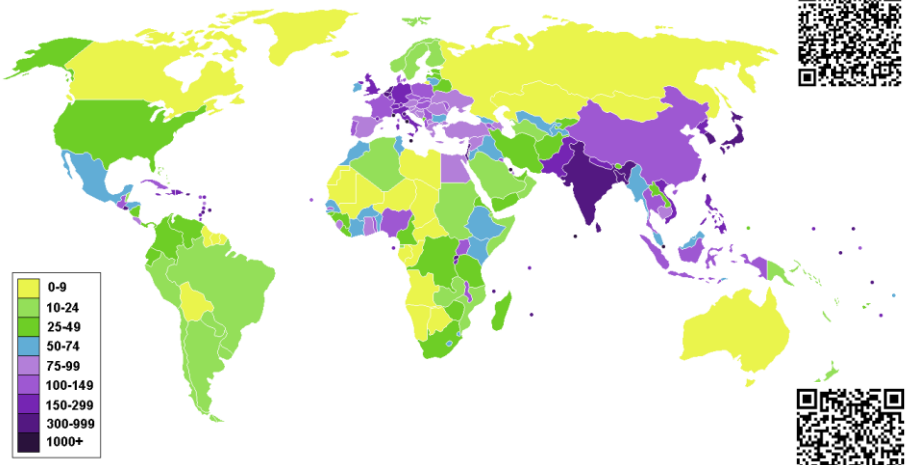
Specific Heat Capacity - The amount of energy needed to raise the temperature of 1kg of a material by 1°C.
Change in internal energy (J) = Mass (kg) x Specific heat capacity (J/kg °C) x Change in temperature (°C)

Latent Heat – The energy transfer during a change of state.
Specific latent heat of fusion – the energy required to **melt** 1 kg of a substance with no change in temperature.
Specific latent heat of vaporisation – the energy required to **evaporate** 1 kg of a substance with no change in temperature.
Change in internal energy (J) = Mass (kg) x Specific latent heat (J/kg)

Thermal Conductivity – How quickly thermal energy passes through a material by thermal conduction.
High value = Loses heat quickly. **Thermal insulators** have a low thermal conductivity.

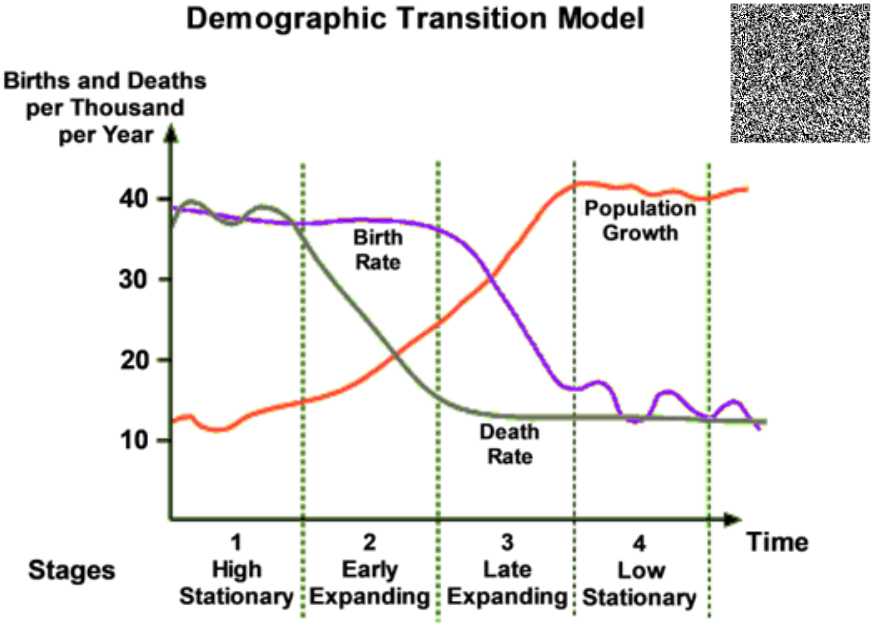
2.1 Key Terms	
2.1.1. Population	The amount of people in a specific place.
2.1.2. Demography	The study of population.
2.1.3. Urbanisation	A growth in the number of people living in urban areas compared to rural areas
2.1.4. Birth rate	The number of babies born per 1000 people each year.
2.1.5. Death Rate	The number of deaths per 1000 people each year.
2.1.6. Infant mortality rate	The number of babies dying under one year old per 1000 people each year.
2.1.7. Population density	The number of people living in a square km.
2.1.8. Rural	An area of countryside.
2.1.9. Demographic transition model	A graph showing population change over time
2.1.10. Population pyramids	A graph showing the population divided into age and gender groups.
2.1.11. Life Expectancy	The average age that a person is expected to life to in a given location.
2.1.12. Natural Increase	The difference between the number of people being born and the number of people that die.
2.1.13. Millionaire city	Any city with over 1 million people.
2.1.14. Mega City	Any city with over 10 million people.

World map showing population density

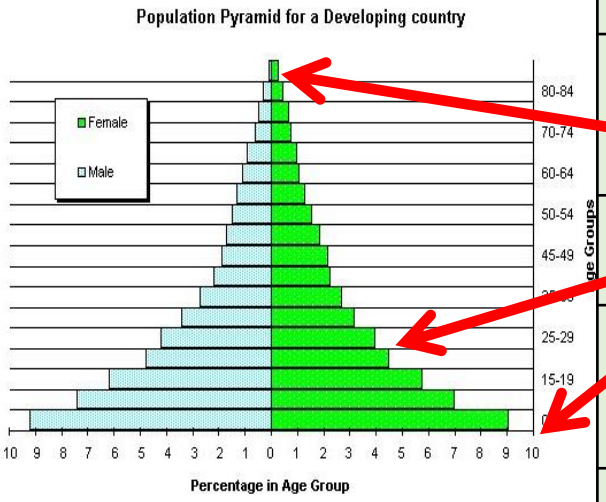


2.2 World Population	
2.2.1. Total world Population	The current total world population is approximately 8.1 billion people
2.1.2. Population by Country	India currently has an approximate population of 1.44 billion people. Second is China with 1.42 billion people and USA is third with 341 million people.
2.1.3. Population by City	Tokyo (Japan) has an approximate population of 37 million people. Second is Delhi (India) with 33 million people. Shanghai (China) has 29 million people. By contrast London is 36th and has approximately 9 million people.
2.1.4. Number of Mega Cities	There are currently an estimated 33 mega cities in the world. 20 are in Asia.
2.1.5. Population Growth	Birth rates are rising more rapidly in Low Income Countries (LICs).

2.3 The Demographic Transition Model	
2.3.1. High Fluctuating	Stage 1 – The first scale consists of high birth rates and death rates. At this stage the population is stable or grows quite slowly because the number of births and deaths are almost equal.
2.3.2. Early Expanding	Stage 2 – In the second stage there is a sharp decline in death rates, causing the population to grow rapidly.
2.3.3. Late Expanding	Stage 3 – The third stage sees the birth rate fall, which slows down population growth.
2.3.4. Low Fluctuating	Stage 4 – In the fourth stage, both the birth rates and death rates are low, resulting in a falling and then stable population.
2.3.5. Declining	Stage 5 – The fifth and final stage shows little population change or even a population decrease.



2.4 Causes of Urbanisation	
2.3.1. LIC	Low Income Country. Countries largely considered poorer and less developed e.g. Kenya.
2.3.2. NEE	Newly Emerging Economy. Countries that are developing or modernising rapidly e.g. India, Nigeria and Brazil.
2.3.3. HIC	High Income Country. Counties generally considered richer and more developed e.g. USA, Japan and UK.
2.3.4. Migration	The movement of people from one location to another with the intent of settling at that place. Migration is one of the leading causes of urbanisation.
2.3.5. Push Factor	A reason why someone might leave their home to live somewhere else e.g. war or economic hardship.
2.3.6. Pull Factor	A reason why someone may be drawn to a particular place e.g. job opportunities, healthcare or education.



2.5 Population Pyramids	
2.5.1	Narrow at the top which shows that there is a small proportion of elderly people.
2.5.2	4% of the population is female aged 25-29.
2.5.3	Wide at the base which means there are a large proportion of young people in the country.
2.5.4	This pyramid is typical of a LIC such as Kenya or Vietnam.

Land Based Organisations 1.1.1

What is land based? Who makes the laws? Who protects it? Who is driving sustainable land use forward?
Where does the money come from?

DEFRA – UK Government Department for the Environment, Food and Rural Affairs

NATURAL ENGLAND

Protects biodiversity by designating SSSI (sites of special scientific interest.) They encourage farmers to look after biodiversity through ELMS (Environmental Land Management Scheme) subsidy. Land owners can gain grants to restore and maintain habitats

Environment Agency

Are responsible for;
Protecting land against flooding
Protecting animal health and welfare on farms
Protecting from all forms of pollution – air, water and land. Can fine farmers if they break regulations on any of the above.

Created in 1919 after the WWI to re-grown the nations timber supply. Timber is a slow crop to grow therefore Forestry England (or Commission) also have secondary remit of providing places for adventure sport and leisure. E.g Moors Valley Park.

Non-Government Organisations - Charities

rspb

RSPB will provide farmers with free surveys of their farmland to identify habitat areas for birds. Farmers can then use these surveys for evidence when they claim subsidies through Natural England's ELMS. They give advice on how to manage farmland hedgerows for wildlife, from their value and history to upkeep and maintenance.

National Trust

Were formed to look after places of historic interest and natural beauty for the benefit of everyone. That includes nearly 260,000 hectares of land in UK – biggest land owner other than the King. Spearheading sustainable farming approaches.

RSPCA ASSURED

.Farms on the RSPCA Assured scheme are assessed and monitored regularly to ensure all the animals are raised to the RSPCA's strict higher welfare standards. They can launch an investigation An investigation is launched every time RSPCA Assured receives a complaint or is made aware of potential welfare issues on one of its member sites. These could be made by farm workers, other animal welfare organisations, RSPCA Assured Assessors or members of the public.

Land Based Sectors – more than farming

Agriculture

Agriculture is split into arable (crop) and livestock (animal) farming. 70% of UK land is covered by agriculture. Worth £7.2 billion in 2022. The **total croppable area** saw little change and was 6.1 million hectares. The **total labour force** on commercial holdings decreased by 1.7% and was 462 thousand people.

Horticulture

Commercial horticulture is the growing of fruit, vegetables and ornamental flowers The horticultural sector is worth over £5 billion to the UK economy. In 2022, UK home-produced fruit was worth just over £1 billion, while vegetables were worth £1.8 billion. Horticulture contributes significantly to food security, however the UK produces only 17% of its fruit and 55% of its vegetable supply,

Infrastructure

Infrastructure is the backbone of the country. It is the set of facilities and systems that serve a country, city, or other area, and encompasses the services and facilities necessary for its economy, households and to businesses to function. Infrastructure is composed of public and private physical structures such as roads, bridges, energy supply, internet and communications supply.

Adventure, Sport & Leisure

The United Kingdom is the largest adventure tourism market in Europe, according to the World Tourism Organization, with 19% of the world's adventure travel tourists. A recent Visit Britain survey concluded that 40% of British tourists prefer sports and active holidays. Also includes animal health and welfare, wildlife conservation and the game, shooting and fishing industries.

Energy Production

UK is transitioning away from fossil fuels to renewable sources. In 2024 43% of energy was from, renewable sources coming from a mix of wind, solar, bioenergy and hydroelectric sources. Burning fossil fuels to create electricity has long been a major contributor in the emission green house gasses. into our atmosphere. UK Government is promising zero-carbon by 2035.

Forestry

The area of woodland in the United Kingdom at 31 March 2023 is estimated to be 3.25 million hectares.
Wood products imported into the UK in 2022 were valued at £10.7 billion . Average employment in 2021 of 20 thousand in forestry, 8 thousand in sawmilling and 5 thousand in panel mills.
The UK was the third-largest net importer (imports less exports) of forest products in 2021, behind China and the USA.

Calf		
1	**Halter**	Restraint of the head. Can be used with a lead.
2	**Hurdles**	Metal fencing used to build an enclosure to keep calves contained.
3	**Calf crush**	Restrains the calf within a metal frame.
4	**Calf head yoke**	Placed over the neck to fully restrain the head for disbudding.

Cattle		
1	**Corral**	Used to contain a herd for observation or further handling.
2	**Race**	A pathway made from large hurdles , used to move cattle.
3	**Crush**	Restrains the cow within a strong metal frame.
4	**Foot-trimming crush**	A crush with a food restraint block to allow safe trimming.
5	**Cubicle**	clean , dry resting area for a cow. Space saving system that allows cows to lie down.
6	**Head yoke**	Placed over the neck to hold head and neck in place.

Sheep		
1	**Race**	A pathway made from large hurdles , used to move sheep.
2	**Halter**	Restraint of the head. Can be used with a lead to move the animal.
3	**Shepherd's crook**	Used to catch sheep by the neck of foot for restraint.
4	**Sheepdog**	Used to move sheep from a distance.

Pig		
1	**Pig board**	Large plastic board used to move pigs along a race and prevent turning around.
2	**Fixed race**	A race that is fixed with concrete to prevent it being moved by pigs.

1. Rope halter and lead

2. Hurdle

3. Crush cage

3. Head yolke

4. cubicle

6. Pig board

Key terms

7. Livestock race

8. Foot-trimming crush