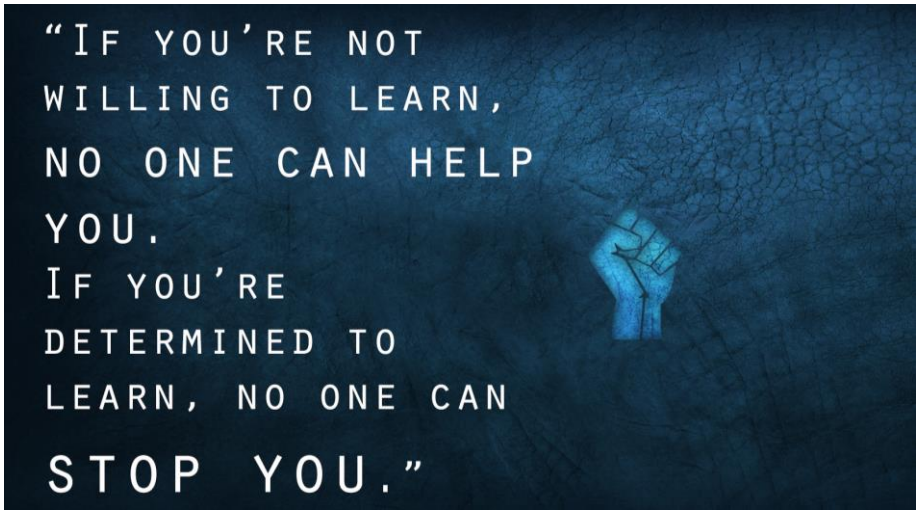
Dorset Studio School
CENTRE OF EXCELLENCE FOR ENVIRONMENTAL SCIENCES

Knowledge Organiser Booklet

Year 9 Spring 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.

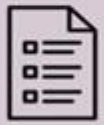
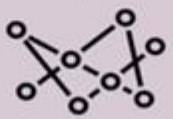
Home learning timetable

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	Chemistry Physics	English Biology	Animal Care	Maths Reading	Land based Humanities
9E	Biology Reading	Chemistry Physics	Land based English	Maths	Animal Care Humanities
9W	Reading	Chemistry Biology	Land Based English	Maths Physics	Animal Care Humanities

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, 

Shakespeare's Tragedies **Year 9 English: Spring 2**

Shakespearean Context (Elizabeth I: 1558-1603 – Elizabethan Era) / (James I: 1603-1625 – Jacobean Era)

King James I

When **Elizabeth I died without any children in 1603**, her cousin **King James VI of Scotland became king of England.** He was given the title King James I. It was **the first time that England, Scotland and Ireland were ruled under a single monarch**. James I was highly intelligent and developed a love of learning. His succession known as the Union of Crowns was unpopular for many Scots, who considered it disastrous / English did not like it either being ruled by the Scottish. **James I became the patron of the King's Men** – the playing company to which Shakespeare belonged to for most of his career.

The Gunpowder Plot

King James I was the intended victim of **Guy Fawkes' Gunpowder plot**. This made him nervous of future regicide attempts. **Shakespeare's 'Macbeth' would have been popular with King James because it shows that those who commit regicide are greatly punished** / mentally tortured. The message of Shakespeare's play acts as a deterrent to anyone thinking of committing regicide.

Staging and Theatre

The play '**Macbeth' was first performed in 1606 at the Globe Theatre**. 16th and 17th Century audiences watched Shakespeare's plays being performed at open-air London theatres during the day. The stage had **no scenery and no props and women were played by boys with unbroken voices**. The poorer 'groundings' stood nearest to the stage and wealthier spectators paid higher prices to watch from seated galleries.

Religion

A **Jacobean audience were extremely religious, believing life to be sacred and God to be the creator of everything**. Thus, when Macbeth claims life is 'a tale told by an idiot...signifying nothing' a Jacobean audience would have been greatly shocked. This nihilistic language (rejecting all religious and moral principles in the belief that life is meaningless) solidifies Macbeth's 'tyrant' and 'hellhound' status towards the end of the play.

Point	Evidence	Explain	Link
The writer uses…	We see this when…	This…	A Shakespearean audience might respond to this by…
The writer gives the impression that…	…in the line "___"	suggests implies highlights	Jacobeans saw religion as…
We can clearly see…	When X says "___"…	illustrates portrays	
	The adjective "___" implies that…	conveys the idea contrasts with reinforces	Elizabethans had a strong belief in…

Useful Sentence Starters

PARAGRAPH STRUCTURE

Point

Evidence

Explain the effects of the language on the reader

Link to context

Shakespeare's Tragedies **Year 9 English: Spring 2**

Form (Play)- Key Terminology 1

Scene - a brief moment in a play consisting of dialogue and action. **Act-** several scenes following on from each other. Each act forms the different parts of the plot.

Stage Direction - an instruction in the script of a play, directing the movements of the actors, the arrangement of scenery, etc.

Audience - the people watching the play.

Playwright - the writer of the play

Soliloquy - an act of speaking one's thoughts aloud when by oneself or regardless of any hearers, especially by a character in a play.

Structure - Key Terminology 2

5 Act play - a drama is often divided into five parts, or acts, which some refer to as a dramatic arc

Exposition - the opening section where the setting is fixed in a particular place and time, the mood is set, and characters are introduced.

Rising Action - an exciting force or inciting event

Climax - the climax is the turning point, which changes the protagonist's fate.

Falling Action - the tension decreases and it wraps up the narrative, resolves its loose ends, and leads toward the closure.

Denouement - the ending with some sort of resolution and the tying up of loose ends.

Language - Key Terminology 3 Literary Devices:

Repetition - Repeated words or ideas

Imagery - Creating a mental picture for the reader through appealing to the senses (smell, touch, taste, see, hear)

Simile - Comparing one thing to another using 'like' or 'as' (e.g. 'as tall as a building')

Metaphor - Describes an object or action in a way that isn't literally true, but helps explain an idea or make a comparison (e.g. 'he was a rampaging bull')

Connotation - What a word makes the reader feel, think or imagine.

Symbolism - the way an object is given greater meaning within the novel so it has added importance.

Motif - a recurring symbol within the novel

Personification - giving human characteristics to an inanimate object

DRAMATIC DEVICES

Foreshadowing: **a device in which the writer gives a warning or indication of the future**

Dramatic Irony: **occurs when the audience are aware of a detail that characters on stage are not aware of.**

Dramatic Tension: **a sense of excitement or anticipation that the audience feels. Pauses and cliffhangers: these techniques are used to give suspense to the play**

The probability scale

R

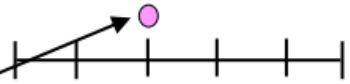
Impossible
0 or 0%

Even chance
0.5, $\frac{1}{2}$ or 50%

Certain
1 or 100%

The more likely an event the further up the probability it will be in comparison to another event
(It will have a probability closer to 1)

There are 2 pink and 2 yellow balls, so they have the same probability



There are 5 possible outcomes
So 5 intervals on this scale, each interval value is $\frac{1}{5}$

Keywords

Probability: the chance that something will happen
Relative Frequency: how often something happens divided by the outcomes
Independent: an event that is not effected by any other events
Chance: the likelihood of a particular outcome
Event: the outcome of a probability – a set of possible outcomes
Biased: a built in error that makes all values wrong by a certain amount

Relative Frequency

$$\frac{\text{Frequency of event}}{\text{Total number of outcomes}}$$

Remember to calculate or identify the overall number of outcomes!

Colour	Frequency	Relative Frequency
Green	6	0.3
Yellow	12	0.6
Blue	2	0.1
	20	

Relative frequency can be used to find expected outcomes

e.g Use the relative probability to find the expected outcome for green if there are 100 selections.

Relative frequency x Number of times

$$0.3 \times 100 = 30$$

Single event probability

R

Probability is always a value between 0 and 1

The probability of getting a blue ball is $\frac{1}{5}$
∴The probability of **NOT** getting a blue ball is $\frac{4}{5}$

The sum of the probabilities is **1**

The table shows the probability of selecting a type of chocolate

Dark	Milk	White
0.15	0.35	

P(white chocolate) = 1 – 0.15 – 0.35
= 0.5

Independent events

The rolling of one dice has no impact on the rolling of the other. The individual probabilities should be calculated separately

Probability of event 1 × Probability of event 2

$$P(5) = \frac{1}{6} \qquad P(R) = \frac{1}{4}$$

Find the probability of getting a 5 and a red

$$P(5 \text{ and } R) = \frac{1}{6} \times \frac{1}{4} = \frac{1}{24}$$

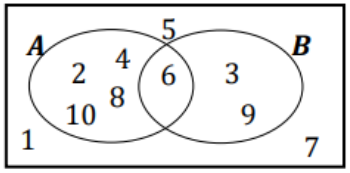
Keywords

Probability: the chance that something will happen
Relative Frequency: how often something happens divided by the outcomes
Independent: an event that is not effected by any other events.
Chance: the likelihood of a particular outcome.
Event: the outcome of a probability – a set of possible outcomes.
Biased: a built in error that makes all values wrong by a certain amount.

Using diagrams

Recap Venn diagrams, Sample space diagrams and Two-way tables

R



	Car	Bus	Walk	Total
Boys	15	24	14	53
Girls	6	20	21	47
Total	21	44	35	100

The possible outcomes from rolling a dice

The possible outcomes from tossing a coin

	1	2	3	4	5	6
H	1,H	2,H	3,H	4,H	5,H	6,H
T	1,T	2,T	3,T	4,T	5,T	6,T

Expected outcomes

Expected outcomes are estimations. It is a long term average rather than a prediction.

Dark	Milk	White
0.15	0.35	0.5

The sum of the probabilities is 1

An experiment is carried out 400 times.
Show that dark chocolate is expected to be selected 60 times

$0.15 \times 400 = 60$

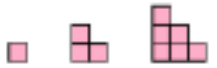
Keywords

Sequence: terms or numbers put in a pre-decided order
Term: a single number or variable
Position: the place something is located
Rule: instructions that relate two variables
Linear: the difference between terms increases or decreases by the same value each time
Non-linear: the difference between terms increases or decreases in different amounts
Difference: the gap between two terms

Other sequences

Fibonacci Sequence
1, 1, 2, 3, 5, 8 ...
Each term is the sum of the previous two terms

Triangular Numbers – look at the formation



1, 3, 6, 10, 15 ...

Square Numbers – look at the formation

1, 4, 9, 16...

Sequences are the repetition of a pattern

Explain term-to-term rule

How you get from term to term

Try to explain this in full sentences not just with mathematical notation
Use key maths language – doubles, halves, multiply by two, add four to the previous term etc

To explain a whole sequence you need to include a term to begin at...

The next term is found by tripling the previous term. The sequence begins at 4.

4, 12, 36, 108...
x3 x3 x3
First term

H Finding the algebraic rule

This is the 4 times table → 4, 8, 12, 16, 20....

4n

7, 11, 15, 19, 22 ← This has the same constant difference – but is 3 more than the original sequence

4n + 3

This is the constant difference between the terms in the sequence

4n + 3

This is the comparison (difference) between the original and new sequence

Inequalities

Year 9 Maths: Spring 2

Keywords

Inequality: an inequality compares who values showing if one is greater than, less than or equal to another
Variable: a quantity that may change within the context of the problem
Rearrange: Change the order
Inverse operation the operation that reverses the action
Substitute: replace a variable with a numerical value
Solve: find a numerical value that satisfies an equation

Simple Inequalities

< less than
≤ Less than or equal to
> More than
≥ More than or equal to

x < 10
Say this out loud
"x is a value less than 10"

10 > x
Say this out loud
"10 is more than the value"

Note
x<10 and 10>x represent the same values

x + 2 ≤ 20
"my value + 2 is less than or equal to 20"
x ≤ 18
The biggest the value can be is 18

Form and solve inequalities R

Two more than treble my number is greater than 11

Form

x → x3 → +2 → 11

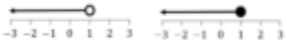
3x + 2 > 11

Solve

x ← -3 ← -2 ← 11

x > 3

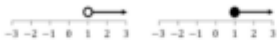
Solutions on a number line



$x < 1$ $x \leq 1$

Both represent values less than 1

Includes the value 1



$x > 1$ $x \geq 1$

Both represent values more than 1

Includes the value 1

● Includes the value it sits above
○ Does NOT include the value it sits above

Values less than or equal to 3 but also more than -1

$-1 < x \leq 3$

This includes the integer values 0,1,2,3

Inequalities with negatives

Method 1 Make x positive first

$2 - 3x > 17$
$+3x \quad +3x$
$2 > 17 + 3x$
$-17 \quad -17$
$-15 > 3x$
$\div 3 \quad \div 3$
$-5 > x$

x is true for any value smaller than -5

Smaller ← → Bigger
-7 -5 -3

✓ CHECK IT!
$2 - 3(-6) = 20$
TRUE/ CORRECT

Method 2 Keep the negative x

$2 - 3x > 17$
$-2 \quad -2$
$-3x > 15$
$\div -3 \quad \div -3$
$x > -5$

x is true for any value bigger than -5

This cannot be true...

$x < -5$

When you multiply or divide x by a negative you need to reverse the inequality

Inequalities with unknown on both sides

Solving inequalities has the same method as equations

$5(x + 4) < 3(x + 2)$
$5x + 20 < 3x + 6$
$2x + 20 < 6$
$2x < -14$
$x < -7$

Check it!

$5(-8 + 4) < 3(-8 + 2)$
$5(-4) < 3(-6)$
$-20 < -18$

✓ -20 IS smaller than -18

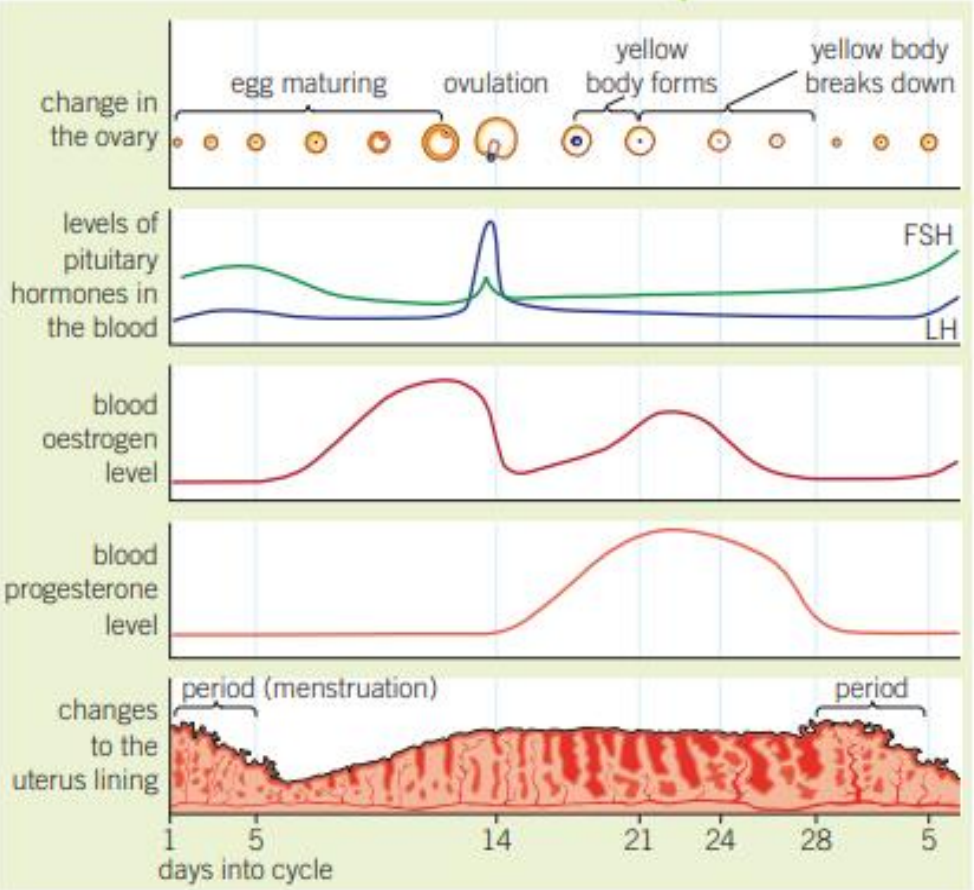
Inequalities: unknown on both sides

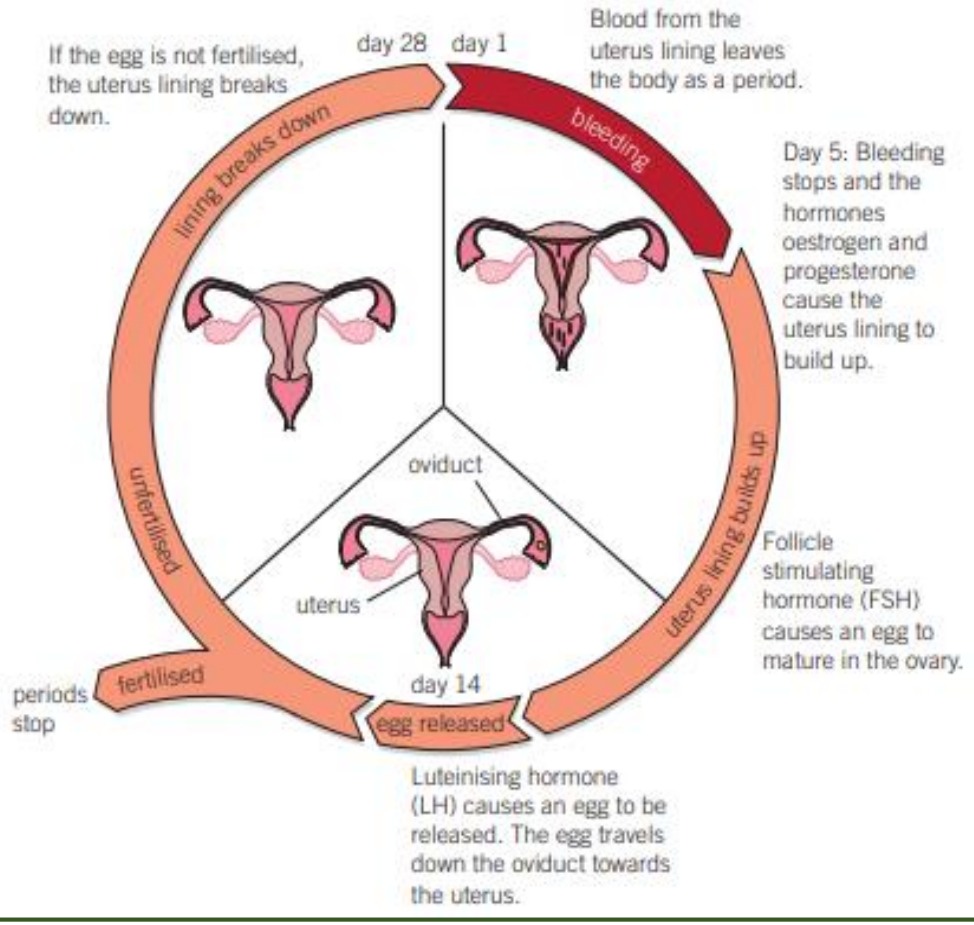
$8x + 5 \leq 4x + 13$ → $x \leq 2$

Any value 2 or less will satisfy this inequality

The **endocrine system** is composed of glands that secrete chemicals called **hormones** into the **bloodstream**. The blood carries hormones to a target organ, where an effect is produced. Compared to the nervous system, the effects caused by the endocrine system are slower but act for longer.

During puberty, reproductive hormones cause the secondary sex characteristics to develop:
Oestrogen : main female reproductive hormone, produced in the ovary
Testosterone : main male reproductive hormone, produced by the testes, stimulates sperm production





Hormone	Released by	Function
follicle stimulating hormone (FSH)	pituitary gland	causes eggs to mature in the ovaries stimulates ovaries to produce oestrogen
luteinising hormone (LH)	pituitary gland	stimulates the release of mature eggs from the ovaries (ovulation)
oestrogen	ovaries	causes lining of uterus wall to thicken inhibits release of FSH stimulates release of LH
progesterone	ovaries	maintains thick uterus lining inhibits release of FSH and LH

Fertility can be controlled by a variety of hormonal and non-hormonal methods of contraception.

Hormonal contraception

- oral contraceptives – contain hormones to inhibit FSH production so no eggs mature
- injection, implant, skin patch, or intrauterine devices (IUD) – slowly release progesterone to inhibit maturation and release of eggs; can last months or years

Non-hormonal contraception

- barrier methods, for example, condoms and diaphragms – prevent sperm reaching the egg
- copper IUD – prevents the implantation of an embryo
- surgical methods of male and female sterilisation
- spermicidal agents – kill or disable sperm
- abstaining from intercourse when an egg may be in the oviduct

Treating infertility with hormones (HT only)

Hormones are used in modern reproductive technologies to treat **infertility.**
FSH and LH can be given as a drug to treat infertility, or **in vitro fertilization.**

IVF treatment

1 mother given FSH and LH to stimulate the maturation of several eggs
2 eggs collected from the mother and fertilised by sperm from the father in a laboratory
3 fertilised eggs develop into embryos
4 one or two embryos are inserted into the mother's uterus (womb) when the embryos are still tiny balls of cells

Individual organisms

Population
the total number of organisms of the same species that live in one specific geographical area

Community
group of two or more populations of different species living in one specific geographical area

Ecosystem
the interaction of a community of living organisms with the non-living parts of their environment

Interspecific competition is between organisms of different species and **intraspecific** competition is between organisms of the same species.

Abiotic factors are non-living factors in the ecosystem that can affect a community.

Too much or too little of the following abiotic factors can negatively affect the community in an ecosystem:

- carbon dioxide levels for plants
- light intensity
- moisture levels
- oxygen levels for animals that live in water
- soil pH and mineral content
- temperature
- wind intensity and direction.

Biotic factors are living factors in the ecosystem that can affect a community.

The following biotic factors would all negatively affect populations in a community:

- decreased availability of food
- new predators arriving
- new pathogens
- competition between species.

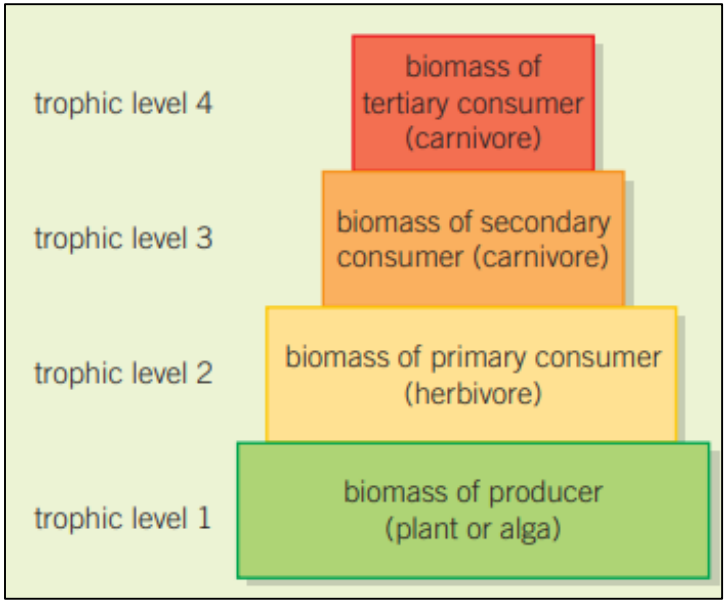
Organisms have features – **adaptations –** that enable them to survive in the conditions in which they live.

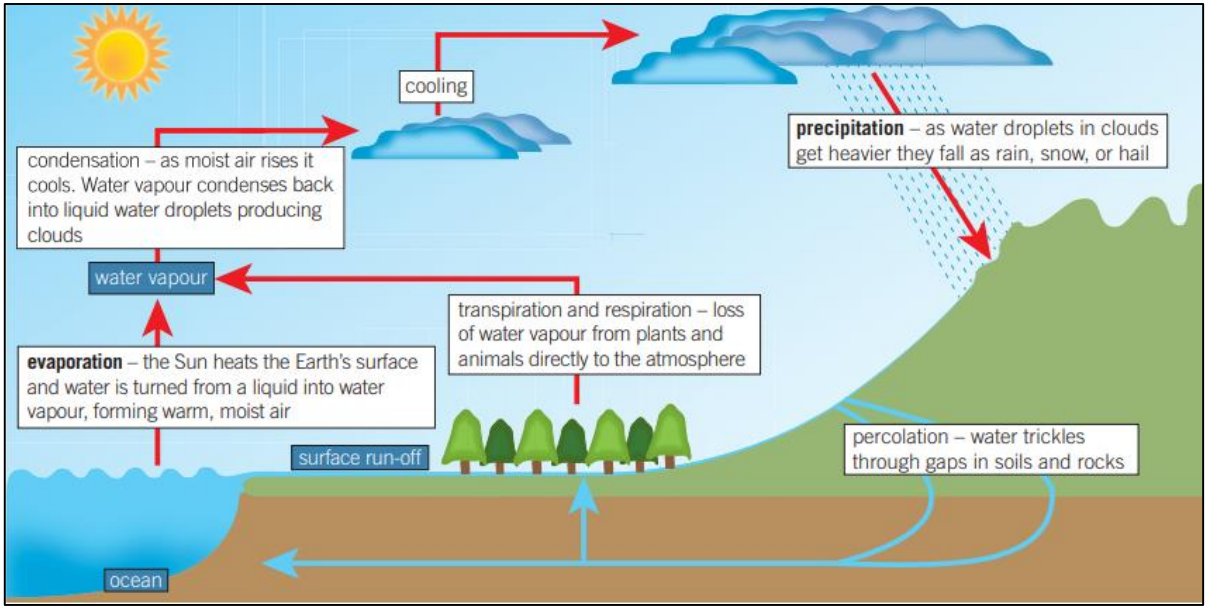
Structural adaptations
The physical features that allow an organism to successfully compete:
- sharp teeth to hunt prey
- colouring that may provide camouflage to hide from predators or hunt prey
- a large or small body-surface area-to-volume ratio.

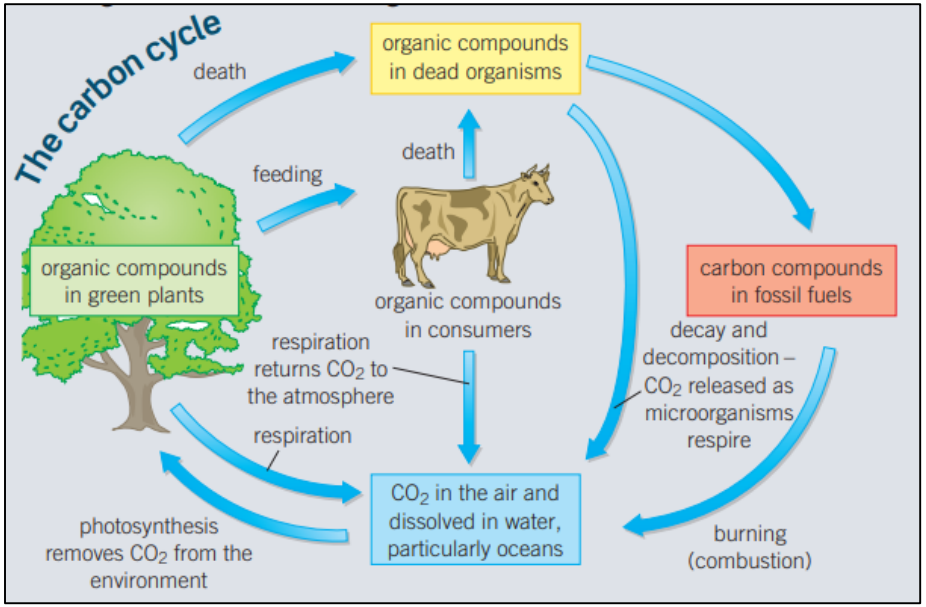
Behavioural adaptations
The behaviour of an organism that gives it an advantage:
- making nests to attract a mate
- courtship dances to attract a mate
- use of tools to obtain food
- working together in packs.

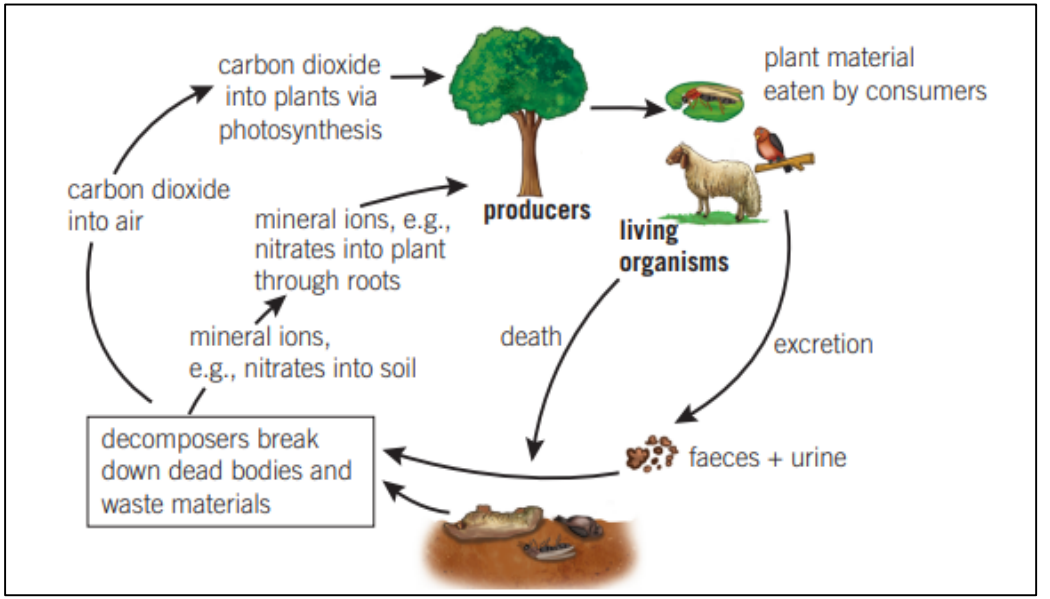
Functional adaptations
Adaptations related to processes that allow an organism to survive:
- photosynthesis in plants
- production of poisons or venom to deter predators and kill prey
- changes in reproduction timings.

Within a community each species interacts with many others and may depend on other species. If one species is removed it can affect the whole community – this is called **interdependence.**


trophic level 4
biomass of tertiary consumer (carnivore)
trophic level 3
biomass of secondary consumer (carnivore)
trophic level 2
biomass of primary consumer (herbivore)
trophic level 1
biomass of producer (plant or alga)


cooling
condensation – as moist air rises it cools. Water vapour condenses back into liquid water droplets producing clouds
precipitation – as water droplets in clouds get heavier they fall as rain, snow, or hail
water vapour
transpiration and respiration – loss of water vapour from plants and animals directly to the atmosphere
evaporation – the Sun heats the Earth's surface and water is turned from a liquid into water vapour, forming warm, moist air
surface run-off
percolation – water trickles through gaps in soils and rocks
ocean


The carbon cycle
death
organic compounds in dead organisms
feeding
death
organic compounds in green plants
organic compounds in consumers
carbon compounds in fossil fuels
respiration returns CO_2 to the atmosphere
decay and decomposition – CO_2 released as microorganisms respire
respiration
CO_2 in the air and dissolved in water, particularly oceans
photosynthesis removes CO_2 from the environment
burning (combustion)


carbon dioxide into plants via photosynthesis
plant material eaten by consumers
carbon dioxide into air
mineral ions, e.g., nitrates into plant through roots
producers
living organisms
mineral ions, e.g., nitrates into soil
death
excretion
decomposers break down dead bodies and waste materials
faeces + urine

Mass and Energy

Chemistry - Year 9 – Spring 1

One **mole** of a substance contains 6.02×10^{23} atoms, ions, or molecules. This is **Avogadro's constant**.

Every element has an **atomic mass,** A_r = its atomic number in grams.

Every substance has a **formula mass**, M_r = sum of the relative atomic mass of all the atoms in the formula.

One mole of a substance has the same mass as the M_r of the substance. **mass = M_r x moles**

Atoms are held together by strong chemical bonds.
In a reaction, those bonds are broken and new ones are made between different atoms.
- Breaking a bond requires energy so is endothermic.
- Making a bond releases energy so is exothermic.

Different bonds require different amounts of energy to be broken (their bond energies).

To work out the overall energy change of a reaction, you need to:
1 work out how much energy is required to break all the bonds in the reactants
2 work out how much energy is released when making all the bonds in the products.

overall energy transferred = energy required to break bonds – energy required to make bonds

- A positive number means an endothermic reaction.
- A negative number means an exothermic number.

Energy can be transferred:

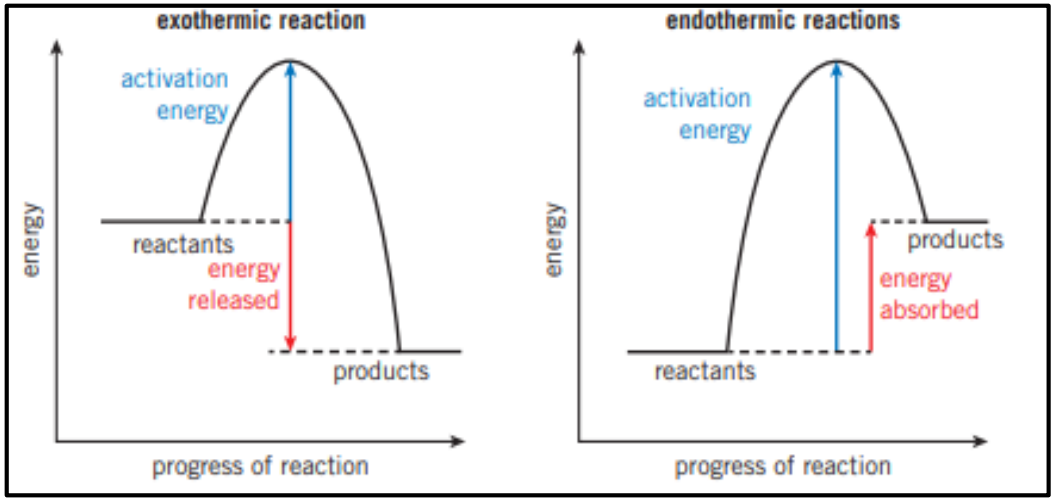
- to the surroundings (experiment) – **exothermic**
- from the surroundings (experiment) – **endothermic**

This energy transfer can cause a temperature change.

Energy is always conserved in chemical reactions.

A reaction profile shows whether a reaction is exothermic or endothermic.

The **activation energy** is the minimum amount of energy that particles must have to react when they collide.



Exothermic reactions –
oxidation • combustion • neutralisation

Endothermic reactions –
thermal decomposition • citric acid and sodium hydrogen carbonate

Chemical Analysis **Chemistry - Year 9 – Spring 2**

In science, a **pure** substance contains a **single element or compound** that is not mixed with any other substance.
Pure substances **melt and boil** at **specific temperatures**.

Formulations are **mixtures**. They have many different components (substances that make them up) in very **specific proportions** (amounts compared to each other). Each component has a **specific purpose** in the mixture.

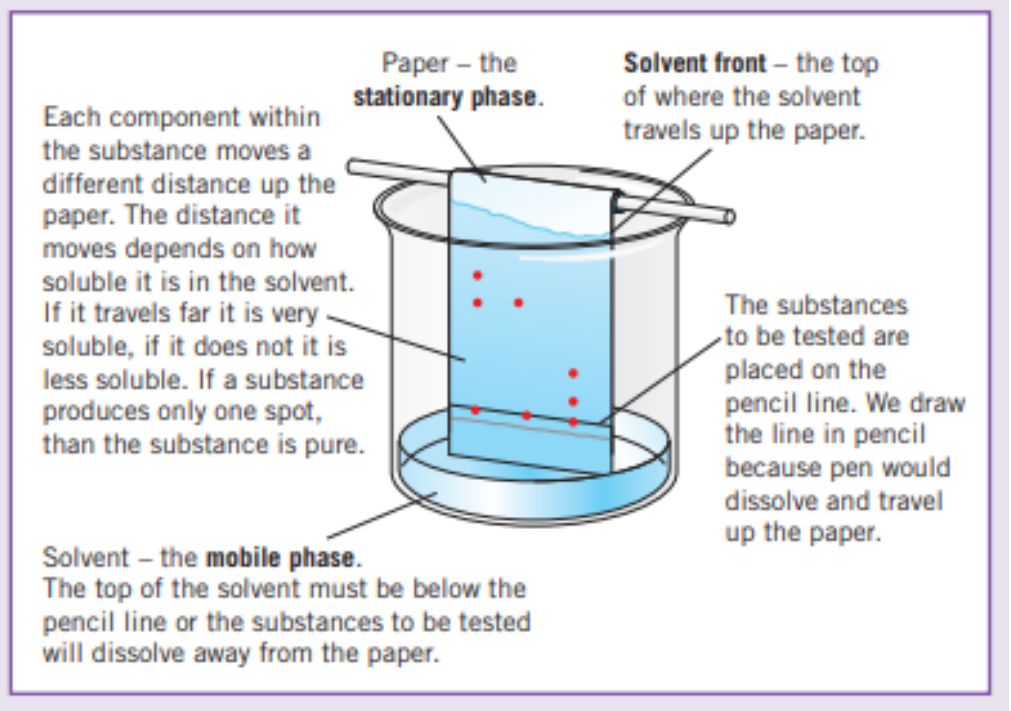
Chromatography is a method to separate different components in a mixture. It is set up with a piece of paper in a beaker containing a small amount of solvent.
The **Rf value** is a ratio of how far up the paper a certain spot moves compared to how far the solvent has travelled.

Rf = distance moved by substance ÷ distance moved by solvent

It will always be a number between 0 and 1. The Rf value depends on the solvent and the temperature, and different substances will have different Rf values. The Rf values for particular solvents can be used to identify a substance.

Tests for different gases.

Hydrogen	hold a lighted splint near the gas	hear a squeaky pop
Oxygen	hold a glowing splint near the gas	splint re-lights
Carbon dioxide	bubble the gas through limewater	the limewater turns milky (cloudy white)
Chlorine	hold a piece of damp litmus near the gas	bleaches the litmus white



Energy Resources

Renewable energy resources

Resource	Main uses	Source	Advantages	Disadvantages
solar energy	generating electricity	sunlight transfers energy to solar cells	can be used in remote places very cheap to run once installed no pollution/greenhouse gases produced	supply depends on weather expensive to buy and install cannot supply large scale demand
	heating	sunlight transfers energy to solar heating panels		
hydroelectric energy	generating electricity	water flowing downhill turns generators	low running cost no fuel costs reliable and supply can be controlled to meet demand	expensive to build hydroelectric dams flood a large area behind the dam, destroying habitats and resulting in greenhouse gas production from rotting vegetation
tidal energy	generating electricity	turbines on tidal barrages turned by water as the tide comes in and out	predictable supply as there are always tides can produce large amounts of electricity no fuel costs no pollution/greenhouse gases produced	tidal barrages: – change marine habitats and can harm animals – restrict access and can be dangerous for boats – are expensive to build and maintain cannot control supply supply varies depending on time of month
wave energy	generating electricity	floating generators powered by waves moving up and down	low running cost no fuel costs no pollution/greenhouse gases produced	floating generators: – change marine habitats and can harm animals – restrict access and can be dangerous for boats – are expensive to build, install, and maintain dependent on weather cannot supply large scale demand
wind energy	generating electricity	turbines turned by the wind	low running cost no fuel costs no pollution/greenhouse gases produced	supply depends on weather large amounts of land needed to generate enough electricity for large scale demand can produce noise pollution for nearby residents
geothermal energy	generating electricity heating	radioactive substances deep within the Earth transfer heat energy to the surface	low running cost no fuel costs no pollution/greenhouse gases produced	expensive to set up only possible in a few suitable locations around the world
biofuels	generating electricity transport	fuel produced from living or recently living organisms, for example, plants and animal waste	can be **carbon neutral** – the amount of carbon dioxide released when the fuel is burnt is equal to the amount of carbon dioxide absorbed when the fuel is grown reliable and supply can be controlled to meet demand	expensive to produce biofuels growing biofuels requires a lot of land and water that could be used for food production can lead to deforestation – forests are cleared for growing biofuel crops

Most of our energy currently comes from **fossil fuels – coal, oil,** and **natural gas.**

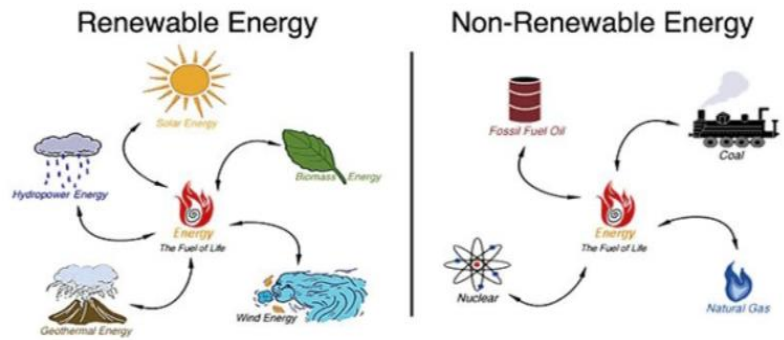
Reliable energy resources are ones that are available all the time (or at predictable times) and in sufficient quantities.

Non-renewable : not replaced as quickly as they are used, will eventually run out

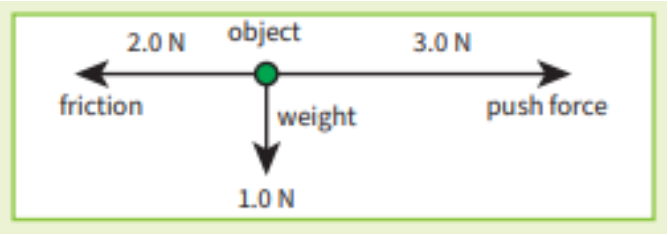
Renewable : can be replaced at the same rate as they are used, will not run out

Non-renewable energy resources

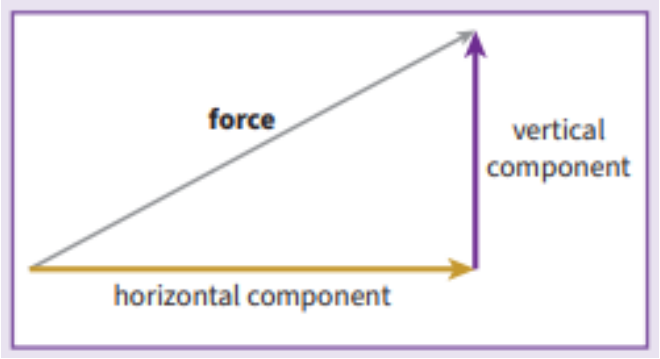
Resource	Main uses	Source	Advantages	Disadvantages
coal	generating electricity	extracted from underground	• enough available to meet current energy demands • reliable – supply can be controlled to meet demand • relatively cheap to extract and use	• will eventually run out • release carbon dioxide when burned – one of the main causes of climate change • release other polluting gases, such as sulfur dioxide (from coal and oil) which causes acid rain • oil spills in the oceans kill marine life
oil	generating electricity transport heating			
natural gas	generating electricity heating			
nuclear fission	generating electricity	mining naturally occurring elements, such as uranium and plutonium	• no polluting gases or greenhouse gases produced • enough available to meet current energy demands • large amount of energy transferred from a very small mass of fuel • reliable – supply can be controlled to meet demand	produces nuclear waste, which is: • dangerous • difficult and expensive to dispose of • stored for centuries before it is safe to dispose of. nuclear power plants are expensive to: • build and run • decommission (shut down).



Free body diagrams use arrows to show all of the forces acting on a single object.
A dot or circle represents the object, with the forces drawn as arrows:
• the arrow length represents the magnitude of the force
• the arrow direction shows the direction of the force.



A single force can always be resolved (split) into two component forces at right angles to each other:

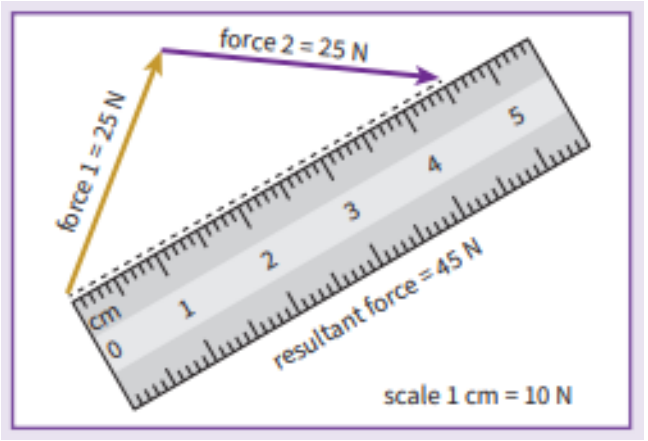


Scalar quantities only have a **magnitude** (e.g., distance and speed).
Vector quantities have a **magnitude** and a **direction** (e.g., velocity and displacement).

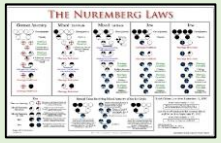
Forces are **vector** quantities.
Contact forces occur when two objects are touching each other.
For example, friction, air-resistance, tension, and normal contact force.
Non-contact forces act at a distance (without the two objects touching).
For example, gravitational force, electrostatic force, and magnetic force.

If two or more forces act on an object along the same line, their effect is the same as if they were replaced with a **single resultant force**.
The resultant force is
• the sum of the magnitudes of the forces if they act in the same direction
• the difference between the magnitudes of the forces if they act in opposite directions.
If the resultant force on an object is zero, the forces are said to be balanced.

Scale drawings can be used to find the resultant of two forces which are not acting along the same line.
The forces are drawn end to end.
The resultant can then be drawn between the two ends, forming a triangle.



20th Century World – The Holocaust — Year 9 Humanities: Spring 2 – 4.0

4.1 Holocaust Overview	
4.1.1. Holocaust	The Holocaust was a genocide that took place during World War II, in which up to 17 million people were systematically exterminated by Nazi Germany and its collaborators. Around 6 million Jews were killed, in addition to Romani peoples, ethnic Poles and Slavs, homosexual men, and many other groups. The Holocaust took place in several stages.
4.1.2. Removal of Rights 	The Nuremburg Laws (1935) meant that Jews were fired from jobs, forced to wear a yellow Star of David, stripped of German citizenship, and banned from German schools, amongst many other measures.
4.1.3. Segregation 	Jews were forced out of their homes and into ghettos. The ghettos were filthy, with poor sanitation, and were extremely overcrowded. Food supplies were low, and so many people starved to death.
4.1.4. Extermination 	Victims were sent to concentration camps, where many were forced to work in hellish conditions, where many died. Others were sent to the gas chambers. Later, camps opened for the sole purpose of extermination.

4.2 Key People	
4.2.1. Dr. Joseph Mengele	He was an SS officer and physician in Auschwitz Concentration Camp. He performed many deadly human experiments on prisoners, gaining the nickname 'The Angel of Death.' He was also involved in the selection of prisoners for death, which others reported he 'seemed to enjoy.' At the end of the war, he escaped capture, dying a free man in Brazil years later.
4.2.2. Anne Frank	She was a German-born Jewish girl, who wrote a diary about the time that her family fled Germany and hid in an attic, in Amsterdam in the Netherlands. After years in hiding, they were arrested, and taken to concentration camps. Anne died of Typhus in Bergen-Belsen, only weeks before the concentration camps were liberated.
4.2.3. Oskar Schindler	He was an industrialist and member of the Nazi party, who is credited with saving 1,200 Jews during the Holocaust. He initially employed Jews in the interests of profit, but soon forged bonds with them, and showed initiative, courage, and dedication to save them.

Holocaust Timeline 4.3

1933 – Adolf Hitler's Nazi Party comes to power

1935 – The Nuremburg laws took away the rights of Jews.

1939 – The Germans occupy Poland, and force Jews to leave their homes. WWII begins.

1940 – Jews put into concentration camps. Mass murder begins

1941 – Jews across Western Europe are forced into ghettos.

1942 – Nazis discuss the 'Final Solution' of killing all European Jews.

1944 – Nazis take over Hungary and begin deporting 12,000 Jews a day.

1945 – Nazis defeated – Concentration camps liberated.

4.4 Key Events of The Holocaust			
4.4.1. The Warsaw Ghetto		The Warsaw Ghetto was the largest of all of the Jewish ghettos in German-occupied Europe during WWII. 400,000 Jews were imprisoned in only 1.3sq mi. of space. 392,000 died, either in the ghetto or after being transported to camps.	October 1940 to May 1943
4.4.2.Prisoners Arrive at Auschwitz		Auschwitz was first constructed to house Polish political prisoners, who began to arrive in May 1940. From early 1942, Auschwitz II became a major extermination site. 1.3 million people were sent there, of whom 1.1 million died.	Operational between May 1940 and January 1945
4.4.3. The Final Solution		The Final Solution was Nazi Germany's plan for the genocide of all Jews. This resulted in the deadliest phase of the Holocaust, in which 2/3 of the Jews across Europe were killed.	Formulated in Jan 1942 at the Wannsee conference
4.4.4. Camps Liberated		As the Allies advanced across Europe, they found camps of sick, starving prisoners. The first camp liberated was Majdanak in July 1944, Auschwitz wasn't until January 1945.	Late 1944 – Early 1945
4.4.5. Deportation and Transportation		Prisoners were treated like cattle, herded onto crowded trains and locked inside for days as they travelled. Most had no light, food or drink, and only a bucket to use as a toilet.	Prisoners had to stand with their hands above their heads to make space.
4.4.6. Clothes		After being separated from their families and registration, prisoners had their clothes stripped, their heads shaved, and were given a striped uniform and striped cap to wear.	Prisoners were only allowed to change their clothes once every 6 weeks.
4.4.7. Food		Prisoners, received very little, if any, food. Watery soup was a staple lunch meal, with stale bread sometimes provided for dinner.	The bread was supposed to last the prisoners for breakfast, too.
4.4.8.Work		Most prisoners worked outside doing heavy duty jobs such as factory or construction work. They often had to walk miles to work. Due to the insufficient food they were given, and widespread disease, many became too weak to work. They were then shot by SS soldiers.	The prisoners provided free slave-labour for many German companies.

Land and Environment

- Students must understand the sheep stratification system within the UK.
- They need to be able to identify where different breeds of sheep are found within the UK and why they are suited to these environments.
- Learners need to know how to recognise signs of good and poor health in livestock

Sheep stratification

The stratified sheep system is unique to the UK, and is designed to play on the strengths of different breeds and the environments and habitats of the country. The UK is made up of a huge range of terrains and landscapes, playing host to approximately 90 different sheep breeds and crosses.

While not every sheep farm in the UK is involved in the stratified system, operating a 'closed flock' instead (one that has little or not exchange of breeding animals with other farms), the stratified system is widespread and very important.

Of those farms involved in the stratified system, there will be considerable variation - some only being involved in one tier, other in two, and a small number having all three tiers within their business

The three tiers are hill, upland and lowland. Some sheep will stay on the same farm, or at least in the same tier, for their whole lives, while others are moved down the system. This system is crucial in keeping the UK sheep industry productive and efficient, and a collapse of any area would change the entire face of the industry.

Hill Breeds

Typical breeds: Welsh Mountain (several types), Swaledale, Scottish Blackface, Cheviots, Rough Fell, Dalesbred, Derbyshire Gritstone, Herdwick.

Traits: Hardy, thick-coated, able-bodied, excellent mothers, adapted to living in the harsh hill conditions.

Purpose: Pure-bred breeding stock. Surplus female lambs and wether lambs (castrated male) are sold as stores to upland/lowland farms to be fattened. Older ewes that have lambed several times are transferred to the milder climates of lower areas and crossed with longwool breeds to produce Mules and half-breds.

Where to find them: Mountain and hill areas that have harsh climates, a short grass-growing season, relatively poor quality of soil and long winters.

Swaledale

Herdwick

Upland

Typical breeds: Female hill breeds mated with breeds such as Bluefaced Leicester, Border Leicester, Teeswater, Wensleydale, Devon & Cornwall Longwool.

Traits: More prolific than hill breeds, and do better on the lower, easier terrain. Mules inherit mothering abilities of hill relatives and prolificacy of upland relatives.

Purpose: Older ewes' drafter from the hills can continue to breed in the easier conditions and are mated with longwool upland breeds to produce Mule lambs. Female Mule lambs are transferred to lowland farms for breeding. They are crossed with a lowland/terminal sire breed. Male lambs are reared for meat production, either here in the uplands or on a lowland farm.

Where to find them: Where conditions are less harsh than in the hills, but land and soil is still not very productive

Blue faced Leicester

Teeswater

Livestock: Sheep

Lowland breeds

Typical breeds: Texel, Suffolk. Charollais, Clun Forest, Romney, Oxford/Hampshire/Dorset Down.

Traits: Grow fast, have a heavier frame, more prolific.

Purpose: Mule ewes are mated to a lowland terminal sire breed to produce crossbred lambs. Most lambs are reared for meat production but some may be kept for replacements. The easier terrain and conditions, better grass growth and larger frame inherited from the terminal sire, mean these lambs grow faster and produce more meat in less time. Slower growing lambs join the store lambs that have arrived from the hill and upland areas to be grown on root crops over the autumn and winter months.

Where to find them: Some low lying areas of Wales and England, mostly in central and eastern England where soil is far more productive and therefore mostly arable. Sheep become part of arable rotations, where fields that have grown crops for a number of years are put to grass to help improve the soil.

Texel

Dorset Down

Normal Temperatures of Farm Animals

Animal	Temperature Degrees Centigrade	Respiration rate Per minute	Pulse rate Per minute
Cattle	38.7	12-20	45-50
Sheep	39.4	12-30	70-90
Pigs	39.2	10-18	70-80
Horse	37.5	8-12	36-42

5 Animal Welfare needs

- need for a suitable environment
- need for a suitable diet
- need to be able to exhibit normal behaviour patterns
- need to be housed with, or apart, from other animals
- need to be protected from pain, suffering, injury and disease.

Handling Equipment

Sheep race

Shepherds crook

Clinical signs of health

• Temperature: principles and process of measurement • Pulse: finding and recording • Respiration: through observation

Visual signs of poor health in sheep

Eyes: sunken, discharge, cloudy, bloodshot, limited sight
Ears: discharge, loss of hearing, injury
Nose, discharge, abrasions
Mouth: pale or discoloured gums, discoloured or broken teeth
Coat: bald pitches
Skin: abnormal colour, break in the skin,
Tail: lumps or abrasions, broken
Feet: Lameness
Posture: reluctance to use all limbs, hunched appearance
Breathing: irregular respiratory rate for the situation
Urine: discoloured, contains blood or pus, strong smell, displaying signs of difficulty passing urine
Faeces: loose consistency, colour change, contains blood, displaying signs of difficulty passing faeces
Food and water intake:
loss of appetite, increased thirst, rapid weight loss, unexpected weight gain
Behaviour: abnormal, isolated
Body language, signs of pain.

Animal Care Component 2: Animal Housing & Accommodation

You will develop your understanding of the accommodation and housing requirements of animals by carrying out the preparation, checking and cleaning out of animal accommodation.

KEY TERMS/VOCABULARLY:
- Animal Welfare Act 2006
- RSPCA 5 Animal Welfare Needs
- Housing
- Accommodation
- Fixtures
- Fittings
- Enrichment
- Bedding
- Heating
- Ventilation
- Sustainability

Context

'Providing a suitable environment' is a legal requirement as set out in the RSPCA's 5 Welfare Needs (Key points of the Animal Welfare Act 2006).

Maintaining animal housing / accommodation also ensures other welfare standards are being met.

Working safely to achieve these goals is covered by another law called "the Health & Safety at Work Act 1974". = Responsible for safety to self & others

Topic overview

- Choosing the right kind of animal accommodation and preparing, checking and cleaning it is an essential part of looking after animals.
- In this component, you will explore how to select and prepare animal accommodation to meet different animals' needs.
- You will learn essential skills for those planning to work with animals, and you will learn how to use these skills both safely and effectively.

To successfully complete this unit you will be able to:

A. Understand factors affecting the selection of animal accommodation

B. Prepare and check animal accommodation using safe working practices

C. Clean out animal accommodation using safe working practices.

A: Understand factors affecting the selection of animal accommodation

A1 Factors affecting suitability of animal accommodation

Animal Species from the following groups:
- smaller/companion animals
- Reptiles
- birds
- invertebrates
- large/livestock animals

Animal accommodation includes:
- animal housing
- fixtures and fittings
- bedding

Factors affecting choice of accommodation:
- space availability (eating, sleeping, exercise)
- access to outside space
- ease of cleaning and maintenance
- access to power for lighting and heating
- facilities for waste disposal
- location of accommodation, (convenience, proximity to other animals, access ventilation, drainage, etc)
- needs and limitations relating to the owner/establishment

Five welfare needs:

A2 Types of animal accommodation

Learners will examine the different types of housing and their suitability for different animals.

Features of housing:
- construction materials
- design - size and layout
- security features to prevent animal escape
- correct and adequate ventilation

Choice of bedding will depend on their properties and functions:
absorbency, texture, level of comfort, suitability for hiding, burrowing and/or nesting, cost, method of disposal.

Factors influencing choice of bedding for animals: the type of animal and its need for warmth, comfort hiding, burrowing/nesting and playing

Problems that may occur with particular bedding.

Types of enrichment and their impact: o how an animal's

Enrichment

Animal Housing and Accommodation

BTEC Animal Care – Spring 2

B: Prepare and check animal accommodation using safe working practices

B1 Prepare animal housing and accommodation for the reception of a range of animals in different situations

Preparing Animal Accommodation will include checking:
- ✓ the housing is suitable for the number and species of animal
- ✓ the housing is situated appropriately for the type of animal
- ✓ there is access to outdoor space where appropriate for the type of animal, including ensuring the outdoor space is suitable
- ✓ the housing is clean and appropriately maintained
- ✓ that the housing is well ventilated.

Preparing fixtures and fittings within animal housing includes checking:
- ✓ food and water equipment for suitability, cleanliness and location within the housing
- ✓ that enrichment materials are present where needed
- ✓ that other equipment is correctly positioned and working where needed.

Prepare animal bedding, including:
- ✓ recognising the purpose of animal bedding: for comfort, warmth, hiding and cleanliness, and to reduce damp and odour.

Prepare animal bedding and materials within animal housing, including:
- ✓ using appropriate types of bedding and materials for the animal species
- ✓ ensuring appropriate quantities are used for the animal(s)
- ✓ checking the cleanliness of bedding and materials placing the bedding and materials in the appropriate parts of the animal housing.

B2 Carry out checks on a range of animal accommodation to ensure it is safe and fit to receive animals.

Check that accommodation and housing is free from hazards, fit for purpose and recognise that animal accommodation needs to be maintained in good condition.

Check the safety and security of animal housing, including:
- ✓ Completing checklists for the purpose of recording and reporting findings
- ✓ Checking the location of the housing
- ✓ Checking housing for potential hazards
- ✓ Checking housing to minimise the risk of animal escape.

Reasons for maintenance:
- ✓ Checking safety and security of housing
- ✓ Preventing problems developing
- ✓ Maximising lifespan of housing.

Types of maintenance activity – painting, repairs, roofing, removal and replacement of rotten areas.

Types of Bedding:
Straw/Hay/Paper)/Wood shaving or dust/Compost/sand/green/vet beds/retile substrate

C: Be able to clean out animal accommodation using safe working practices

C1 Develop practical skills in cleaning animal accommodation and equipment used for different animals using safe working practices.

Demonstrate safe working practices, including:
- ✓ removal or restraint of animal(s)
- ✓ safe positioning of equipment
- ✓ correct body position when cleaning and safe lifting techniques o safe use of equipment
- ✓ use of personal protective equipment
- ✓ manual handling operations regulations.

The importance of animal housing cleanliness and the consequences of unclean accommodation and bedding.

Potential barriers to levels of hygiene.

Good practice in cleaning animal accommodation, including:
- ✓ knowing how frequently to carry out cleaning
- ✓ knowing when to spot clean and when to do a full clean out
- ✓ thorough cleaning of feeding and watering equipment
- ✓ knowing when extra precautions need to be observed when cleaning animal accommodation and what these entail.

Methods of cleaning animal accommodation, including:
- ✓ using suitable cleaning products
- ✓ current relevant legislation relating to the control of substances that may be hazardous to health
- ✓ using correct methods when cleaning out bedding and faeces to ensure animal hygiene while minimising unnecessary disposal of clean bedding
- ✓ disposing of waste safely and where possible sustainably
- ✓ using equipment and tools safely and correctly.

Methods of safe disposal of waste, including:
o used bedding - composting
o packaging - recycling
o waste food and dirty water – recycling, energy (AD)
o safe disposal of used cleaning materials. – collection

C2 Maintain and clean equipment that has been used to clean animal accommodation, using safe working practices.

Reasons for maintaining and carrying out the cleaning of equipment:
- ✓ preventing cross-contamination
- ✓ maintaining good hygiene
- ✓ removing dirt, debris and hair
- ✓ using equipment and tools safely and correctly
- ✓ general maintenance of the equipment.