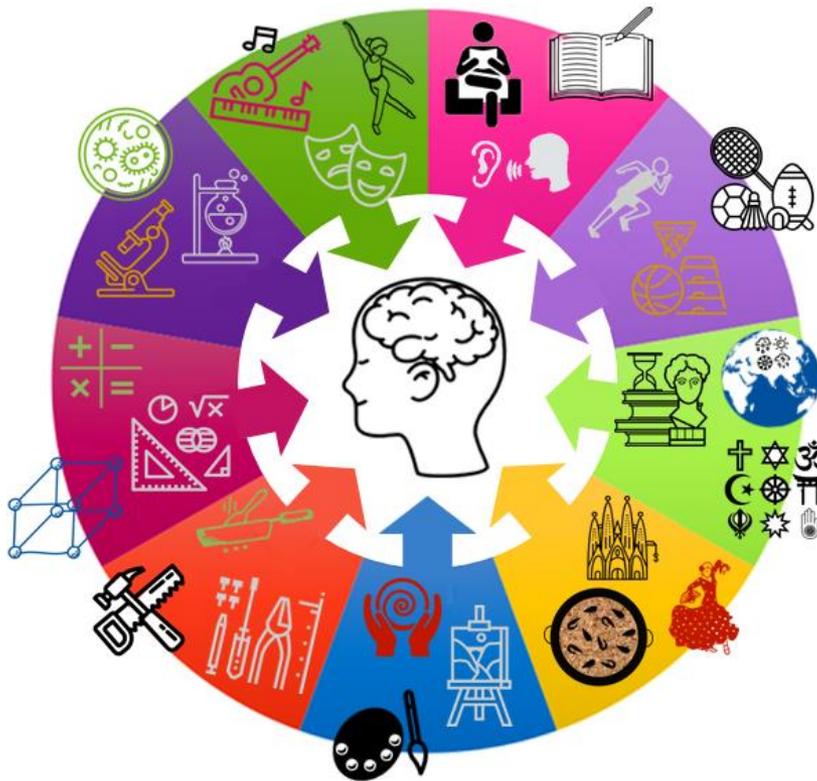


100% book - Year 10 Grammar

Aim to memorise 100% of the knowledge on these Knowledge Organisers.



Term 3

Swindon Academy 2023-24

Name:	
Tutor Group:	
Tutor & Room:	

"If you are not willing to learn, no one can help you.

If you are determined to learn, no one can stop you."

How to use your 100% book of Knowledge Organisers and Quizzable Organisers

Knowledge Organisers

Knowledge Organisers contain the essential knowledge that you **MUST** know in order to be successful this year and in all subsequent years.

They will help you learn, revise and retain what you have learnt in lessons in order to move the knowledge from your short-term memory to long-term memory.

Quizzable Knowledge Organisers

These are designed to help you quiz yourself on the essential Knowledge.

Use them to test yourself or get someone else to test you, until you are confident you can recall the information from memory.

Top Tip

Don't write on your Quizzable Knowledge Organisers! Quiz yourself by writing the missing words in your prep book. That way you can quiz yourself again and again!

Expectations for Prep and for using your Knowledge Organisers

1. Complete all prep work set in your subject prep book.
2. Bring your prep book to every lesson and ensure that you have completed all work by the deadline.
3. Take pride in your prep book – keep it neat and tidy.
4. Present work in your prep book to the same standard you are expected to do in class.
5. Ensure that your use of SPAG is accurate.
6. Write in blue or black pen and sketch in pencil.
7. Ensure every piece of work has a title and date.
8. Use a ruler for straight lines.
9. If you are unsure about the prep, speak to your teacher.
10. Review your prep work in green pen using the mark scheme.

How do I complete Knowledge Organiser Prep?

Step 1

Check Epraise and identify what words /definitions/facts you have been asked to learn. Find the Knowledge Organiser you need to use.

The image shows the Epraise website interface. On the left is a 'Planner' for the week of 20th May to 26th May 2020, with columns for Sun, Mon, Tue, Wed, Thu, and Fri. On the right is a 'Knowledge Organiser' for 'Particle Theory'. It contains various sections: 'What is particle theory?', 'What is the law of conservation of mass?', 'What are the different states of matter?', 'What are the differences between the states of matter?', and 'What are the differences between the states of matter?'. There are also diagrams of particle arrangements for solid, liquid, and gas.

Step 2

Write today's date and the title from your Knowledge Organiser in your Prep Book.

The image shows a printed page from a knowledge organiser. It has handwritten notes in blue ink. At the top right, the date '29th May 2020' is written. Below it, the title 'Particle theory' is written. The page contains several sections: 'A. What is particle theory?' (The theory that all matter is made up of particles), 'A. Describe the arrangement and movement of particles in the three states of matter.' (Solid: regular pattern, vibrate; Liquid: random, not touching; Gas: far apart, random), 'B. What are the differences between the states of matter?' (Melting, Freezing, Evaporation, Condensation), and a diagram of 'Gaining energy' (melting, evaporation) and 'Losing energy' (freezing, condensation).

Step 3

Write out the keywords/definitions/facts from your Knowledge Organiser in FULL.

The image shows handwritten notes on lined paper. At the top, the date '29th May 2020' is written. Below it, the title 'Properties of the states of matter' is written. The notes define particle theory as 'all matter is made of particles'. It then describes the three states: 'Solid = regular pattern particles vibrate in fixed position', 'Liquid = particles are arranged randomly but are still touching each other particles can slide past each other and move around', and 'Gas = Particles are far apart and are arranged randomly. Particles carry a lot of energy'.

Step 4

Read the keywords/definitions/facts out loud to yourself again and again and write the keywords/definitions/facts at least 3 times.

The image shows handwritten notes on lined paper. It repeats the definitions of the three states of matter three times: 'Solid = regular pattern particles vibrate in fixed position', 'Liquid = particles are arranged randomly but are still touching each other particles can slide past each other and move around', and 'Gas = Particles are far apart and are arranged randomly. Particles carry a lot of energy'.

Step 5

Open your quizzable Knowledge Organiser. Write the missing words from your quizzable Knowledge organiser in your prep book.

The image shows a printed page from a quizzable knowledge organiser. It has handwritten answers in blue ink. The questions are: 'A. What is particle theory?' (The theory that all matter is made up of particles), 'A. Describe the arrangement and movement of particles in the three states of matter.' (Solid: regular pattern, vibrate; Liquid: random, not touching; Gas: far apart, random), 'B. What are the differences between the states of matter?' (Melting, Freezing, Evaporation, Condensation), and 'What are the different?' (Self quizzing, Arrangement/movement of matter). There are also diagrams of 'Gaining energy' and 'Losing energy'.

Step 6

Check your answers using your Knowledge Organiser. Repeat Steps 3 to 5 with any questions you got wrong until you are confident.

The image shows handwritten notes on lined paper. It repeats the definitions of the three states of matter, with checkmarks indicating correct answers and corrections. For example, 'Gas = Particles are far apart and are arranged randomly. Particles carry a lot of energy' has a checkmark. There are also some corrections to the liquid definition: 'Liquid = particles are arranged randomly but are still touching each other particles can slide past each other and move around'.

Make sure you bring in your completed Prep notes to demonstrate that you have completed your prep.

ENGLISH –A Christmas Carol- Grammar

1. Context	
<p>Writer: Charles Dickens (1812-1870) Dates: First published in 1843 Genre: Allegorical; a ghost story. Era: Victorian Set: Victorian London Structure: The novella is divided into 5 staves (chapters).</p>	<p>Biography of Dickens</p> <ul style="list-style-type: none"> Born in Portsmouth in 1812 When Dickens was 12, his father was sent to debtors' prison as he was unable to pay his bills. His mother and youngest siblings were sent with him, whilst Dickens stayed with a family friend. In order to help his family, Dickens had to leave school and work in a factory sticking labels on bottles. Dickens dedicated his life to writing works that revealed the horrors of life in Victorian London for those living in poverty.
<p>Christmas: Dickens grew concerned that, due to capitalism, society had lost sight of traditional values (Christian morals, forgiveness, charity). He felt that Christmas was the perfect time to reconnect with these values and used his novella to do this. He also knew that Christmas would be a popular topic so it would sell well – therefore enabling his message to reach a wider audience.</p>	<p>London and inequality: Dickens juxtaposes scenes of middle-class comfort and poverty to emphasise the close proximity and contrast of the different classes. It highlights the Christian concept of 'love thy neighbour'. The urban setting allows Dickens to exercise his fondness for hyperbole, with the exaggerated extremes of poverty adding to the effect of the 'plight of the poor'.</p>
<p>The Poor Law, 1834 In order to deter poor people from claiming financial help, the government made claimants live in workhouses: essentially, prisons for the poor. Dickens hated this law. He spent 1843 touring factories and mines in England and wished to highlight the situation facing poor people. A Christmas Carol was published soon after – in December 1843.</p>	<p>Malthusian Theory The reformation of The Poor Law was partially informed by the writings of Thomas Malthus. Malthus argued that if living standards increased, population would increase and eventually the number of people would be too great for the food that could be produced. As a result, Malthus argued it was important not to support the poor or improve their standards of living, but to allow them to die if they couldn't support themselves because charity would only prolong their suffering.</p>
<p>The Supernatural: Victorian society was fascinated by the supernatural, including mediums, ghosts, and spiritualism. However, this belief in the supernatural was also heavily influenced by the church, with the belief that ghosts were souls who were trapped in purgatory (a place of suffering where the souls of sinners were trapped).</p>	

2. Key Characters
<p>Ebenezer Scrooge: The protagonist is initially established as an archetypal villain who dismisses the goodwill and generosity associated with Christmas. After being forced to transform, he feels remorse for his avarice and becomes a symbol of Christmas spirit. Scrooge embodies the relentless capitalist spirit of the time, but also demonstrates that everyone has the capacity to reform.</p>
<p>Bob Cratchit: Bob is Scrooge's downtrodden but loyal employee. His family are a symbol of Victorian poverty, cheerfulness in adversity, togetherness and Christmas Spirit. Bob shows pity for Scrooge, and provides a contrast to Scrooge's isolation and meanness. His son, Tiny Tim, is an emblem for noble poverty; he accepts his disability without complaint.</p>
<p>Fred: Fred juxtaposes the character of Scrooge and epitomises the concept of goodwill and forgiveness, refusing to be discouraged by his uncle's misery. People speak highly of Fred and his generosity, in contrast to how they speak of Scrooge. Fred shows that Scrooge has chosen isolation and shows forgiveness to Scrooge, welcoming him in Stave Five.</p>
<p>Marley's Ghost: Marley's ghost is the spiritual representation of Scrooge's potential fate. The chains that drag him down symbolize the guilt caused by his failure to help people in need. Marley's ghost warns Scrooge that he too will experience the same guilt if he continues to deny people help.</p>
<p>The ghosts: The Ghost of Christmas Past is a symbol of childhood, truth and enlightenment. The Ghost of Christmas Present represents goodwill, plenty and the festival of Christmas. The Ghost of Christmas Yet to Come symbolises a catastrophic future for mankind.</p>
<p>Belle: The woman that Scrooge was engaged to when he was a young man. Belle's role is crucial in Scrooge's transformation, as the scenes show Scrooge what he might have had in his life if he had not been so avaricious. Through the character of Belle, Dickens sets emotional love directly against Scrooge's love of money and suggests that avarice can lead to a deprivation of kindness, love and empathy.</p>

3. Central Themes	
<p>Social injustice</p>	<p>Dickens highlights the unfairness within society through the juxtaposition of the poor and wealthy. Through Scrooge's refusal to give to charity and his exclamation that the poor should be in workhouses or die, Dickens illustrates the selfishness of the higher classes and the injustice of wealth distribution in Victorian society. The children, Ignorance and Want, personify the dangerous consequences of allowing poverty to continue.</p>
<p>Transformation and redemption</p>	<p>By establishing Scrooge as an archetypal villain, Dickens is able to emphasise the idea that everyone is capable of transformation and redemption. From starting as a greedy, avaricious miser, Scrooge is able to reflect upon his actions and to understand that he must live his life helping others to avoid Marley's fate.</p>
<p>Social responsibility</p>	<p>Dickens felt that every individual had a responsibility for those around them. Marley's Ghost conveys the message of the novella when he cries, 'Mankind was my business' demonstrating that the proper 'business' of life is not about seeking financial reward but having concern for others. Dickens highlights the importance of trying to make a difference- whether that be large financial contributions (Scrooge), smaller contributions (Fezziwig) or simply showing compassion and kindness to one another.</p>

4. Key Vocabulary	
Avarice	Extreme greed of possessions or money
Salvation	Saving someone from harm or destruction
Miserly	someone who is greedy and does not like spending money
Callous	Mean or cruel
Antithesis	The exact opposite of something
Epiphany	A moment of sudden understanding
Redemption	The act of being saved or freed from sin or error
Benevolence	Kind and helpful towards others
Philanthropic	Showing concern for others by being charitable
Misanthropic	Someone who has a hatred for other people
Penitence	sincere regret for wrong or evil things that you have done
Remorse	a strong feeling of sadness and regret about something wrong that you have done
Deprivation	When someone is unable to have the things they need or want
Despotism	exercising power in a cruel and controlling way
Capitalism	A political system in which property, business, and industry are owned by private individuals and not by the government

5. Key Terminology, Symbols and Devices	
Stave	Chapters in the novella, but we normally associate staves with music, as if the book is a Christmas carol, and each chapter is part of the song. As Christmas carols are repetitive and easy to remember, it links to how Dickens wishes his message to be remembered.
Intrusive Narrator	A narrator who interrupts the story to provide a commentary to the reader on some aspect of the story or on a more general topic. In 'A Christmas Carol' the narrator helps to shape our impressions of Scrooge.
Circular structure	Circular narratives cycle through the story one event at a time to end back where the story originated.
Allegory	A story that can be interpreted to reveal a hidden meaning, typically a moral or political one.
Allegorical figures	An allegorical figure is a character that serves two purposes: first, they are an important person in the story in their own right, and, second, they represent abstract meanings or ideas.
Foreshadowing	Foreshadowing is a literary device in which a writer gives an advance hint of what is to come later in the story.
Didactic	A type of literature that is written to inform or instruct the reader, especially in moral or political lessons.
Semantic Field	A set of words that are related in meaning. Dickens frequently uses semantic fields of warmth and coldness that are associated with the characters.

The Big Ideas	Notes
<p>Dickens promotes a social responsibility in which he argues that everyone must contribute.</p>	
<p>Dickens suggests that change is possible, and that everyone has capacity to redeem themselves and reform.</p>	
<p>Dickens illustrates the injustice of wealth distribution in Victorian society and highlights the dangerous consequences of allowing poverty to continue</p>	
<p>Dickens uses contrasting characterisation to demonstrate how we must be generous and socially responsible.</p>	
<p>Dickens uses contrasts in setting to highlight social injustice</p>	

10GS – B5 – Homeostasis and Response

The nervous system

Job is to **detect** stimuli (changes in environment) and **respond** if needed.
Consists of:

Receptors



Specialised cells that detect stimuli, found in sense organs and internally

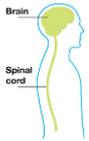
Neurons

3 types – sensory, relay and motor

Carry **impulses** joining all parts of the nervous system



Co-ordination Centres



Brain, spinal cord, pancreas.
Coordinates the response

Effectors



Organs that bring about a response

muscle or gland

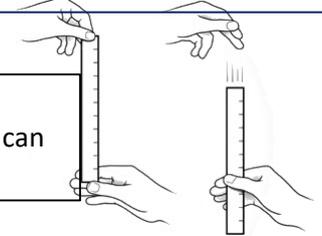
RP 6 - Investigation into the effect of a factor on human reaction time.

1. Person A holds out hand with a gap between thumb and finger.
2. Person B holds ruler with the zero at the top of person A's thumb.
3. Person B drops ruler without telling Person A and Person A must catch it.
4. The distance on the ruler level with the top of person A's thumb is recorded
5. Repeat this ten times.
6. Repeat steps 1-5 after a factor has been changed
7. Use conversion table to convert ruler measurements into reaction time.

The 'factor' could be...

- Caffeine consumption
- Hours of sleep
- Alcohol consumption
- Amount of practice

A computer reaction test can also be used.



Control variables : distance above the hand, distance between finger and thumb, hand used (dominant or non-dominant, all other factors listed in the box above except the one being changed.

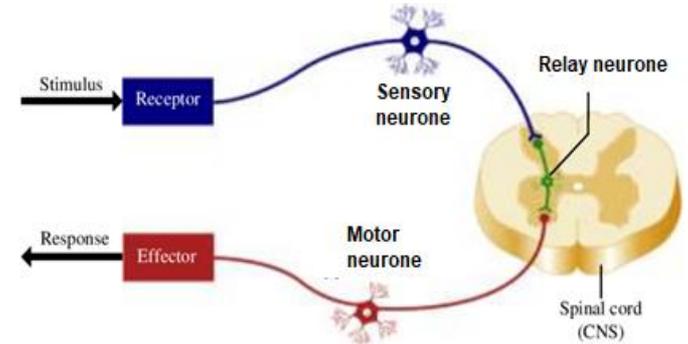
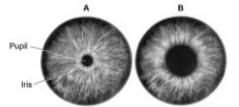
Reflexes

A reflex is an automatic, rapid response

Reflexes do not involve the conscious part of the brain, so cannot be overridden

The response might be brought about by:

- muscle - e.g. pupil being constricted with bright light or knee jerk response
- gland – e.g. mouth watering or tears being released when something gets in your eye



Reflex Arc

stimulus → receptor → **sensory neurone** → **relay neurone** → **motor neurone** → effector → response

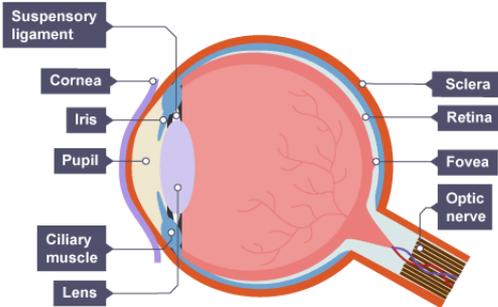
Example

Hot pan → pain receptors → **sensory neurone** → **relay neurone** → **motor neurone** → hand muscles → release pan

10GS – B5 – Homeostasis and Response

The eye

The eye is a sense organ containing **receptors** sensitive to light intensity and colour.



Structure	Function
Cornea	Refracts light - bends it as it enters the eye
Iris	Controls how much light enters the pupil
Lens	Further refracts light to focus it onto the retina
Retina	Contains the light receptors
Optic nerve	Carries impulses between the eye and the brain
Sclera	Tough white outer layer of the eye. It helps protect the eye from injury

To focus on a near object – the lens becomes thicker, this allows the light rays to refract (bend) more strongly.

To focus on a distant object – the lens is pulled thin, this allows the light rays to refract slightly.

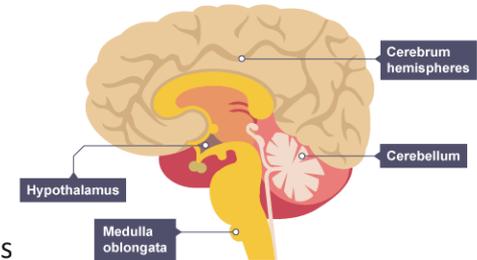
The amount of light entering the eye is controlled by a reflex action. The size of the pupil changes in response to bright or dim light. This is controlled by the muscles of the iris.

The brain

The brain controls complex behaviour. It is made of billions of interconnected neurones and has different regions that carry out different functions.

There are four main areas in the brain:

- The **cerebrum** (the outer layer is called the cerebral cortex). It controls thought and high-level functions, such as language and verbal memory.
- The **cerebellum**, which controls balance, co-ordination of movement and muscular activity.
- The **medulla**, which controls unconscious activities such as heart rate and breathing rate,
- The **hypothalamus**, which is the regulating centre for temperature and water balance within the body.



Neuroscientists have been able to map various regions of the brain to particular functions by studying patients with brain damage, electrically stimulating different parts of the brain and using **MRI**. They use strong magnetic fields and radio waves to show details of brain structure and function.

Scientists have stimulated different parts of the brain with a weak electrical current and asked patients to describe what they experienced. If the motor area is stimulated, the patient makes an involuntary movement.

10GS – B5 – Homeostasis and Response

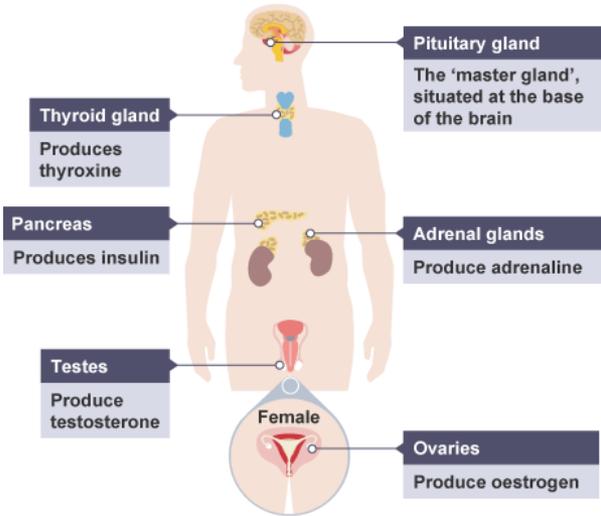
1. What is the function of the following:
2. How does the eye focus on near objects?
3. How does the eye focus on far objects?
4. How does the eye focus in the light and dark?
5. What does the brain control?
6. What does the cerebrum control?
7. What does the medulla control?
8. What does the hypothalamus control?
9. How have scientists discovered more about the brain?

Structure	Function
Cornea	
Iris	
Lens	
Retina	
Optic nerve	
Sclera	

10GS – B5 – Homeostasis and Response

Hormonal responses

Hormones are chemicals released by glands
They are carried in the bloodstream.
Hormonal responses are slower than nervous responses but they last longer.



Homeostasis

This means keeping internal conditions (of the body or a cell) constant to ensure optimum functioning.

In humans, this includes regulating:

- temperature
- water levels
- blood glucose concentration

Homeostasis can involve nervous or hormonal responses.

Receptors detect changes in the body

Coordination centres (brain, pancreas, spinal cord etc) receive and process information

Effectors carry out responses to return to normal

Blood glucose concentration

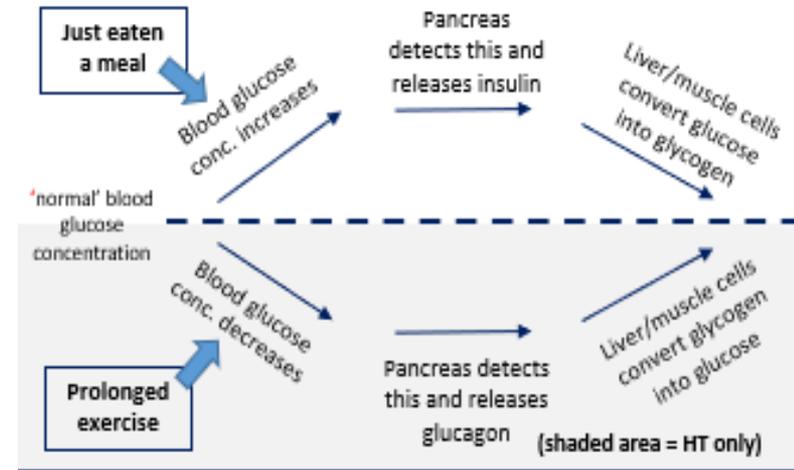
Blood glucose is monitored by the **pancreas**.

If glucose levels rise, the pancreas releases **insulin** into the blood.

This is a message to the liver to remove glucose and store it as **glycogen**.

If blood glucose is too low, **glucagon** is released.

The liver responds by breaking down glycogen into glucose and releasing it into the blood.



Diabetes

There are two types – Type 1 and Type 2

Both result in a lack of control over blood glucose levels

	Type 1	Type 2
Cause	No insulin is made by the pancreas	Insulin is made, but the liver and muscle cells do not respond
Treatment	Injections of insulin Pancreatic transplant	Controlling carbohydrate intake Losing weight

HT only

Negative feedback is when the release of something brings the levels back towards acceptable levels, it maintains a steady state.

E.g. if blood glucose increases, insulin is released to bring blood glucose back towards the normal range.

10GS – B5 – Homeostasis and Response

1. What is a hormone?
2. Where are hormones released from?
3. Which gland is known as the 'master gland'?
4. How do hormones travel?
5. How does the speed and duration of a hormonal response compare to a nervous response?
6. Which hormone is made by the thyroid gland?
7. What is homeostasis?
8. Give two examples of conditions that are controlled within the human body

Blood glucose concentration

1. Which organ monitors blood glucose?
 2. Which hormone is released when blood glucose increases?
 3. What causes blood glucose to increase?
 4. Which hormone is released when blood glucose falls?
 5. Which organ releases the hormones involved in blood glucose control?
-
1. What are the two types of diabetes?
 2. Why are type 1 diabetics unable to control their blood glucose?
 3. What is the treatment for type 1 diabetes?
 4. What is the problem in type 2 diabetes?
 5. What is the treatment for type 2 diabetes?

10GS – B5 – Homeostasis and Response

Adrenaline and thyroxine (HT only)

Adrenaline is produced by the **adrenal glands**.

It is produced in times of fear or stress.

It **increases heart rate** to ensure **more oxygen and glucose** to the cells to prepare for the 'fight or flight' response.

Thyroxine is produced by the **thyroid gland**.

It is involved in regulating **metabolic rate** and growth and development.

Puberty

Females – **Oestrogen** is the main female reproductive hormone produced in the ovary. At puberty, eggs begin to mature, and one is released approximately every 28 days. This is called ovulation.

Males – **Testosterone** is the main male reproductive hormone produced by the testes and it stimulates sperm production.

Name of contraception	Description	+	-
Condoms/diaphragm	Barrier	Very effective, condom protects against STIs	Unreliable if not used properly
Oral Contraception (pill)	Hormonal (oestrogen or progesterone, stops FSH so no eggs mature)	Very effective	Must remember to take everyday, can have side effects
Injection/implant/skin patch	Slow-releasing hormone	Long lasting	Side effects such as heavy periods
Intrauterine Device (IUD or Coil)	Barrier method. Can also contain hormones	Long lasting (up to 5 years)	Side effects such as heavy periods
Surgical Sterilisation	Tying or cutting of sperm ducts/ oviducts.	Almost 100% effective	Difficult or impossible to reverse

Menstrual Cycle

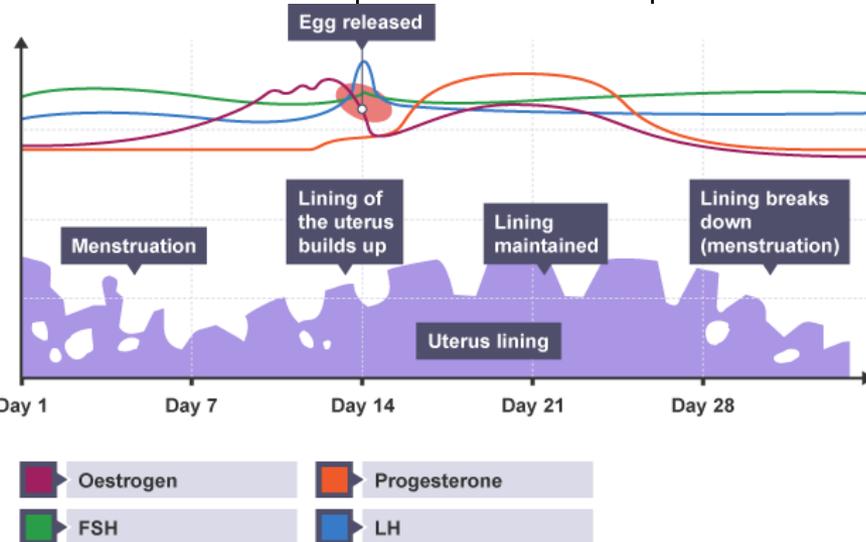
The menstrual cycle is controlled by several hormones:

FSH – from the pituitary. Causes an egg to mature in the ovary

LH – from the pituitary. Causes ovulation

Oestrogen and progesterone are involved in maintaining the lining of the womb.

HT – Oestrogen also feeds back to the pituitary to stop producing FSH.



Infertility (HT only)

Fertility drugs LH and FSH can be given to increase the number of eggs released and increase the chance of fertilisation.

IVF

- Woman takes a dose of FSH and LH - stimulates the maturation of several eggs.
- Eggs are collected and fertilised by sperm from the male
- Fertilised eggs develop into embryos.
- One or two embryos inserted into the female's uterus.

Negatives:

- very emotionally/ physically stressful
- success rates are not high
- can lead to multiple births (twins, etc.)
- Many embryos are not used & destroyed

10GS – B5 – Homeostasis and Response

Adrenaline and thyroxine (HT only)

1. Where is adrenaline released from?
2. What effects does adrenaline have?
3. What does thyroxine do?

1. What is the male hormone?
2. What is ovulation?
3. Which organ produces oestrogen?

1. Which hormones are contained in the contraceptive pill?
2. Name a 'barrier' method of contraception
3. How does the contraceptive pill prevent pregnancy?
4. Give one advantage and one disadvantage of taking the contraceptive pill.
5. Give one disadvantage of surgical sterilisation

Menstrual Cycle

1. Which organ releases FSH and LH?
2. What are the two other menstrual cycle hormones?
3. Approximately how long is one cycle?
4. Around which day of the cycle does ovulation occur?
5. What is the role of oestrogen and progesterone?

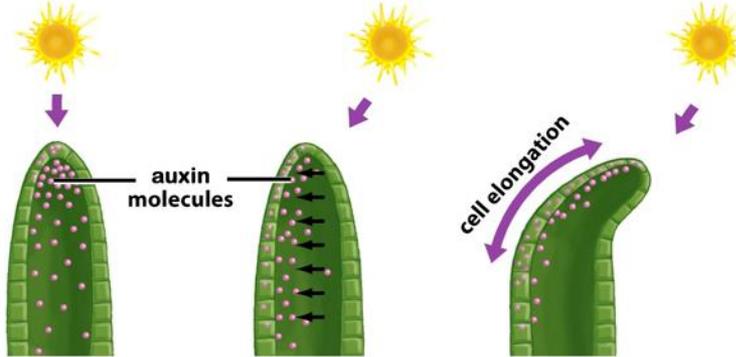
1. Which drugs are given as fertility drugs?
2. How do they increase the chances of getting pregnant?
3. How many embryos are transferred to the womb in IVF?
4. Give two negatives of IVF treatment

10GS – B5 – Homeostasis and Response

Plant hormones

Plants produce hormones to coordinate and control growth and responses to light (phototropism) and gravity (gravitropism or geotropism).

Unequal distributions of auxin cause unequal growth rates in plant roots and shoots.



The auxin collect on the side of the plant in the shade.

Gibberellins are important in initiating seed germination.

Ethene controls cell division and ripening of fruits.

The uses of plant hormones

Plant growth hormones are used in agriculture and horticulture.

Auxins are used:

- as weed killers
- as rooting powders
- for promoting growth in tissue culture.

Ethene is used in the food industry to control ripening of fruit during storage and transport.

Gibberellins can be used to:

- end seed dormancy
- promote flowering
- increase fruit size.



10GS – B5 – Homeostasis and Response

1. Name a plant hormones
2. What is phototropism?
3. What is geotropism?
4. Where does auxin collect?
5. Why are gibberellins important?
6. What is ethene used for?
7. In agriculture, what is auxin used for?
8. In agriculture, what is ethene used for?
9. In agriculture, what is gibberellins used for?

10GS – B5 – Homeostasis and Response

Controlling body temperature

- Body temperature is monitored and controlled by the thermoregulatory centre of the brain.
- The thermoregulatory centre contains receptors sensitive to the temperature of the blood.
- Human body temperature is 37°C
- The skin also contains temperature receptors that feedback to the thermoregulatory centre in the brain.

Response when body temperature too high

Energy transfer from the skin to the surroundings is increased by:

- Vasodilation (the blood vessels dilate – get wider).
- Sweat is produced.

Response when body temperature too low

Energy transfer from the skin to the surroundings is reduced by:

- Vasoconstriction (the blood vessels constrict – get narrower).
- Sweat production stopped.
- Muscles contract (shiver), this requires the exothermic reaction respiration which increases the temperature of the muscles.

The human kidney

- The kidneys are important for excretion and homeostasis.
- The kidneys produce urine by filtering the blood. It then reabsorbs all of the glucose and any mineral ions and water needed by the body by selective reabsorption.

ADH

- The water balance of the blood is controlled by the hormone ADH.
- ADH changes the amount of water reabsorbed by the kidney tubules.
- ADH is secreted by the pituitary gland in the brain.

Low water concentration in the blood	High water concentration in the blood
More ADH released	Less ADH released
More water reabsorbed	Less water reabsorbed
Small amount of concentrated urine produced	Large amount of diluted urine produced

Removing waste

- carbon dioxide produced during respiration can produce an acidic solution.
- carbon dioxide is removed via the lungs.
- Urea is produced during the breakdown of proteins.
- Proteins are broken down to amino acids which cannot be stored by the body.
- The liver removes the amino group from amino acids via a process called deamination to produce ammonia which is very toxic.
- Ammonia is converted to urea.
- If cells lose or gain too much water by osmosis, they do not function efficiently.

Uncontrolled loss of water and mineral ions

- Water loss via the lungs during exhalation.
- Water, mineral ion and urea loss through sweat in the skin.

Controlled loss of water and mineral ions

- Water, mineral ion and urea loss via the kidneys in the urine.

Treating kidney failure

Dialysis

- A dialysis machine carries out the function of the kidneys.
- The level of useful substances in the blood are maintained while urea and excess mineral ions pass from the blood into the dialysis fluid.

Disadvantages:

- A strict diet needs to be followed.
- You need to send regular long sessions connected to the dialysis machine.
- The blood levels are in balance for only a short time so you can feel tired and unwell between treatments.
- It can become harder to balance substance in the blood if you have dialysis for a long period of time.

Transplant

- A kidneys from a donor replaces the diseased or damaged kidney.
- To prevent reject the tissue types of the recipient and donor are matched closely.

Disadvantages:

- Immunosuppressant drugs need to be taken to reduce the chance of rejection.
- There is a shortage of donor kidneys.

10GS – B5 – Homeostasis and Response

1. Where are temperature receptors found in the human body?
2. What is human body temperature.
3. How does the body respond when the blood temperature is too high?
4. How does the body respond when the blood temperature is too low?

1. How is carbon dioxide removed from the body?
2. Why does carbon dioxide need to be removed from the body?
3. How is urea formed?
4. What methods are responsible for uncontrolled loss of water, mineral ions and urea from the body?
5. Which organ is responsible for the controlled loss of water, mineral ions and urine?

1. What substances are reabsorbed in the kidneys?
2. What does ADH do?
3. Which gland secretes ADH?
4. Complete the table below to show how water level in the blood is controlled.

Low water concentration in the blood	High water concentration in the blood

1. What are the two main ways of treating kidney failure?
2. What are the disadvantages of dialysis?
3. What are the disadvantages of kidney transplants?

T3 – Y10 Chem - C7 Organic chemistry

Crude oil

Crude oil = a mixture of **hydrocarbons**.

- It is a **non-renewable resource (fossil fuel)**
- Made from remains of dead sea creatures **compressed** over millions of years

Hydrocarbons - molecules containing **hydrogen** and **carbon only**.

Two types of hydrocarbons are **alkanes** and **alkenes**.
The hydrocarbons in crude oil are mostly alkanes.

Alkanes

- Alkanes = **saturated** hydrocarbons.
- Held together by **single covalent bonds**.
- General formula = C_nH_{2n+2}
- Have different boiling points – longer the chain, higher the boiling point

You need to remember the names, and formulas of the first 4 alkanes.

Name of Alkane	Structural Formula	Molecular Formula
methane	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$	CH_4
ethane	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$	C_2H_6
propane	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$	C_3H_8
butane	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$	C_4H_{10}

Fractional Distillation

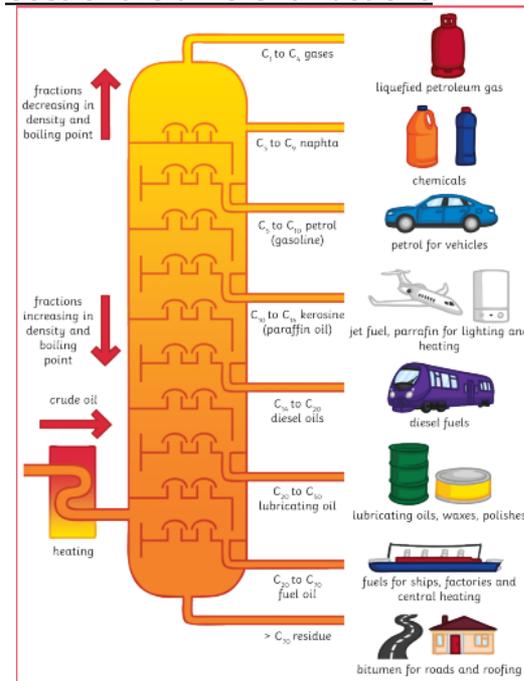
- Used to **separate** the mixtures of hydrocarbons in **crude oil**.

Steps in Fractional Distillation

1. Crude oil enters **fractioning column** and is heated to boiling point so the hydrocarbons evaporate.
2. It is **cooler** at the **top** of the fractionating column and **hotter** at the **bottom**.
3. Vapours rise up the column and, as they rise, they cool
4. The different hydrocarbons condense at different **boiling points**
5. The different 'fractions' have different **properties**

Short-Chain Molecules	Increasing Chain Length	Long-Chain Molecules
		
thin	As chain length increases, the boiling point of the hydrocarbon chains also increases.	thick
		
		
	Viscosity describes how easily a substance can flow e.g. treacle is very viscous; it is thick.	
	Flammability is a measure of how easily a substance burns.	

Uses of the different fractions



Supply and demand

Product	Supply in tonnes	Demand in tonnes
petrol	100	300
diesel	200	100
heating oil	250	50

After fractional distillation, we find:

- we have more of the long chain hydrocarbons than we need
- There are not enough short chain hydrocarbons.
- Short chain are more useful as they are more flammable so can be used as fuels.

T3 – Y10 Chem - C7 Organic chemistry

- | | | |
|---|--|---|
| <ol style="list-style-type: none">1. What is crude oil?2. What is a hydrocarbon?3. What type of hydrocarbons are alkanes?4. State the general formula for alkanes.5. Name the first four alkanes.6. What sort of bonding is found in hydrocarbons? | <ol style="list-style-type: none">1. What is the name for the process that results in the separation of the fractions of crude oil?2. What happens to the boiling point of hydrocarbons as the chain length increases?3. What happens to the viscosity of hydrocarbons as the chain length increases?4. What does flammable mean?5. What are the two changes of state that occur during fractional distillation?6. Which physical property is used to separate the fractions? | <ol style="list-style-type: none">1. What is one use for the hydrocarbons that are between 14 and 20 carbons long?2. What is the range of lengths of hydrocarbons in fuel oil?3. What are the smallest hydrocarbons used for?4. What happens to the flammability of hydrocarbons as the chain length increases?5. What is the range of hydrocarbon lengths found in petrol?6. What is the problem with supply and demand of the different hydrocarbon chains? |
|---|--|---|

T3 – Y10 Chem - C7 Organic chemistry

Cracking

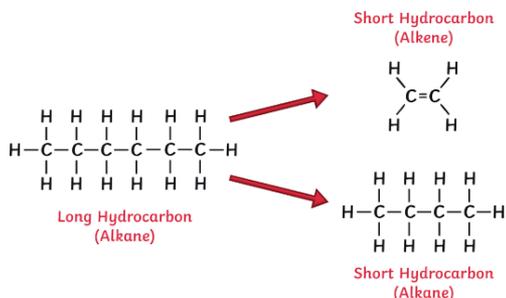
- This is done to solve the problem of having too many long chain hydrocarbons and not enough short ones
- Long hydrocarbons are **broken down** into smaller, more useful hydrocarbons.
- Short chain hydrocarbons are more useful as they are more flammable

Two types of cracking: catalytic and steam cracking.

Catalytic cracking – needs a **high temperature** and a **catalyst**.

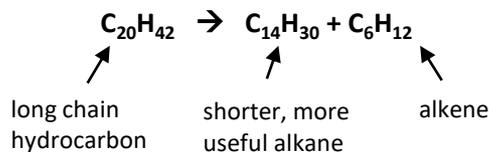
Steam cracking – **high temperature and steam**

- Cracking produces a **short-chain alkane** and an **alkene**.



Cracking equations

Same number of carbon and hydrogen atoms on both sides of the equation:



Alkenes

- Alkenes are **unsaturated** hydrocarbons.
- Contain carbon-carbon **double bonds**.

Test for Alkenes

Use bromine water to test for alkenes. If an alkene is present, the bromine water turns from orange/brown to colourless. Alkanes do not react with bromine water.

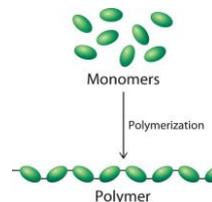


Uses for alkenes:

- Can be used as fuels
- Can be used as a starting material for other chemicals
- Can be used to make polymers (e.g. plastic)

Polymers

- Polymers are large molecules made of many repeating units (monomers)
- Alkenes (small molecules) are joined together to make polymers



Poly(ethene) – plastic bags/drinks bottles

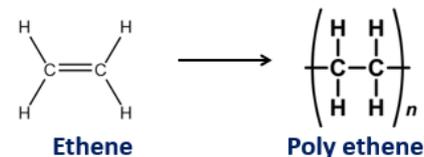
Poly(propene) – strong tough plastics

Drawing and naming polymers

1. Redraw the **monomer given**, but without the double bond. Make sure to copy all other elements exactly.
2. Put brackets around the monomer and extend joining bonds out through the brackets on both sides
3. Add an 'n' at the bottom right of the bracket
4. To name the polymer, you put **poly** in front of the monomer name

E.g.:

Draw and name the polymer made from the monomer ethene:



Combustion of Hydrocarbons

Combustion means burning.

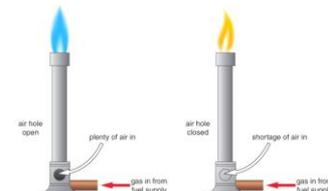
Complete combustion - when there is a good supply of **oxygen** for a fuel to burn.

Fuel + oxygen → carbon dioxide + water

Incomplete combustion - **not enough oxygen**

Products are **carbon monoxide** and water.

Carbon monoxide = poisonous gas



T3 – Y10 Chem - C7 Organic chemistry

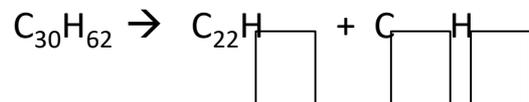
1. What is cracking?

2. Why is cracking done?

3. What are the two types of cracking?

4. What conditions are needed for catalytic cracking?

5. Complete this cracking equation by putting numbers in the boxes:



6. What two types of hydrocarbons are formed during cracking?

1. Why are alkanes called 'unsaturated'?

2. Which chemical is used to test for alkenes?

3. What is the colour change for a positive alkene test?

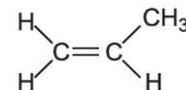
4. Give two uses for alkenes

5. What are polymers?

6. What is the name for the small molecules that make up polymers?

1. What is the name of the polymer formed from the monomer butene?

2. Draw the polymer made from the monomer propene given below:



3. Name the polymer made in question 2

4. What is combustion?

5. When does incomplete combustion happen?

6. What are the waste products of complete combustion?

7. Which toxic gas is formed during incomplete combustion?

Alkenes

Alkenes are hydrocarbons with a double carbon-carbon bond.

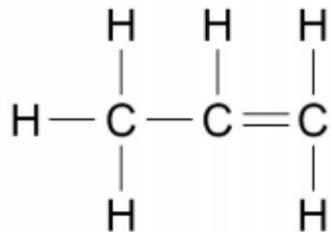
The general formula for the homologous series of alkenes is C_nH_{2n}

Alkene molecules are unsaturated because they contain two fewer hydrogen atoms than the alkane with the same number of carbon atoms.

The first four members of the homologous series of alkenes are ethene, propene, butene and pentene.

Alkene molecules can be represented in the following forms:

C_3H_6 (propene)



T3 – Y10 Chem - C7 Organic chemistry

1. What an alkene?
2. What kind of bond is there in an alkene?
3. What is the general formula for an alkene?
4. List the first four members of the homologous series
5. Show the two ways which ethene can be represented

T3 – Y10 Chem - C7 Organic chemistry

Alkenes

Alkenes are hydrocarbons with a double carbon-carbon bond.

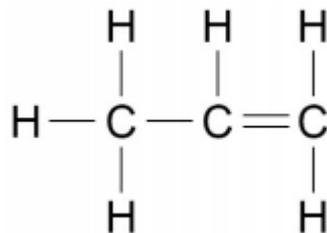
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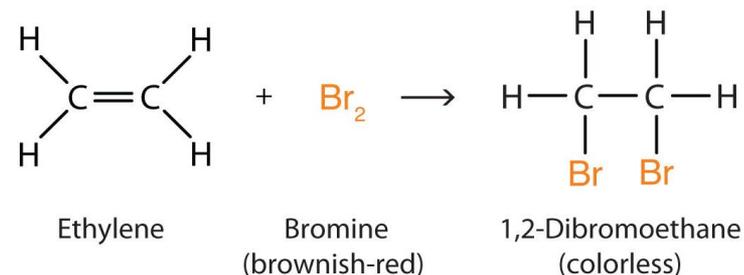
C_3H_6 (propene)



It is the functional groups that determine the reactions of organic compounds.

Alkenes react with oxygen in combustion reactions in the same way as other hydrocarbons, but they tend to burn in air with **smoky flames** because of incomplete combustion.

Alkenes react with hydrogen, water and the halogens, by the addition of atoms across the carbon-carbon double bond so that the double bond becomes a single carbon-carbon bond.



T3 – Y10 Chem - C7 Organic chemistry

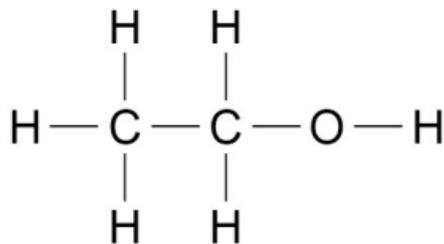
1. What an alkene?
 2. What kind of bond is there in an alkene?
 3. What is the general formula for an alkene?
 4. List the first four members of the homologous series
 5. Show the two ways which ethene can be represented
1. What type of combustion do alkenes generally do?
 2. What do alkenes also react with?
 3. What happens when an alkene reacts with hydrogen, water or the halogens?

T3 – Y10 Chem - C7 Organic chemistry

Alcohols contain the functional group –OH.

Methanol, ethanol, propanol and butanol are the first four members of a homologous series of alcohols.

Alcohols can be represented in the following forms: $\text{CH}_3\text{CH}_2\text{OH}$ or as



Aqueous solutions of ethanol are produced when sugar solutions are fermented using yeast. The conditions used for fermentation is sugars dissolved in water, mixed with yeast. an air lock to allow carbon dioxide out, while stopping air getting in. warm temperature , 25-35°C.

When any of the first four alcohols react with sodium, they form a salt (sodium alkoxide) and hydrogen gas. You will see fizzing.

Alcohols are flammable. They burn in air because of the presence of a hydrocarbon chain. They burn to produce carbon dioxide and water. This property allows alcohols to be used as a fuel.

When alcohols are added to water, they mix easily to produce a solution.

When alcohols can react with an oxidising agent. The oxidation of alcohols is an important reaction in organic chemistry. Primary alcohols can be oxidized to form aldehydes and carboxylic acids; secondary alcohols can be oxidized to give ketones. Tertiary alcohols, in contrast, cannot be oxidized without breaking the molecule's C–C bonds.

T3 – Y10 Chem - C7 Organic chemistry

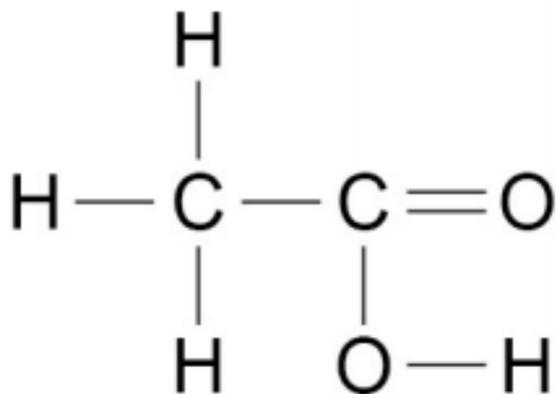
1. What is an alcohol?
2. What is the functional group in an alcohol?
3. What is the general formula for an alcohol?
4. List the first four members of the homologous series of alcohols
5. Show the two ways which ethanol can be represented

1. How is ethanol produced
2. What are the conditions for fermentation

1. What happens when alcohols react with sodium?
2. What happens when alcohols react with water?
3. What happens when alcohols react with air?
4. What happens when alcohols react with oxidising agents?

T3 – Y10 Chem - C7 Organic chemistry

Carboxylic acids have the functional group -COOH . The first four members of a homologous series of carboxylic acids are methanoic acid, ethanoic acid, propanoic acid and butanoic acid. The structures of carboxylic acids can be represented in the following forms: CH_3COOH



When any of the first four carboxylic acids react with carbonates, to form a salt, water and carbon dioxide

When they dissolve in water to form acidic solutions with pH values less than 7

Carboxylic acids can react with alcohols to form esters in a process called Fischer esterification. An acid catalyst is required and the alcohol is also used as the reaction solvent.

Carboxylic acids are weak acids because they only partially ionise in solution. Their solutions do not contain many hydrogen ions compared to a solution of a strong acid at the same concentration. A weak acid's pH will be higher than a strong acid's pH at the same concentration. In a solution of strong acid, the molecules are fully ionised. In a weak acid, few of the molecules are ionised.

T3 – Y10 Chem - C7 Organic chemistry

1. What is a carboxylic acid?
2. What is the functional group in a carboxylic acid?
3. What is the general formula for a carboxylic acid?
4. List the first four members of the homologous series of carboxylic acids
5. Show the two ways which ethanoic acid can be represented

1. What happens when carboxylic acid react with carbonates?
2. What happens when carboxylic acid dissolve in water?
3. What happens when carboxylic acids react with alcohol?

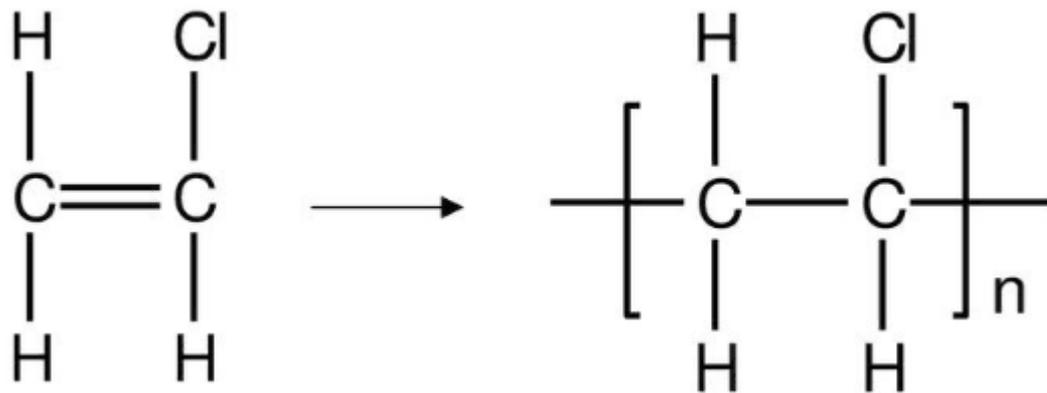
1. Why are carboxylic acids weak acids?

T3 – Y10 Chem - C7 Organic chemistry

Alkenes can be used to make polymers such as poly(ethene) and poly(propene) by addition polymerisation.

In addition polymerisation reactions, many small molecules (monomers) join together to form very large molecules (polymers).

For example: In addition polymers the repeating unit has the same atoms as the monomer because no other molecule is formed in the reaction.

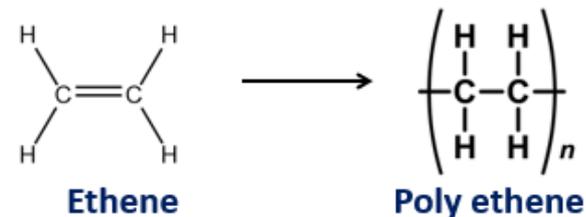


Drawing and naming polymers

1. Redraw the **monomer given**, but without the double bond. Make sure to copy all other elements exactly.
2. Put brackets around the monomer and extend joining bonds out through the brackets on both sides
3. Add an 'n' at the bottom right of the bracket
4. To name the polymer, you put **poly** in front of the monomer name

E.g.:

Draw and name the polymer made from the monomer ethene:



T3 – Y10 Chem - C7 Organic chemistry

What is used to make polymers?

What is a monomer?

Describe addition polymerisation

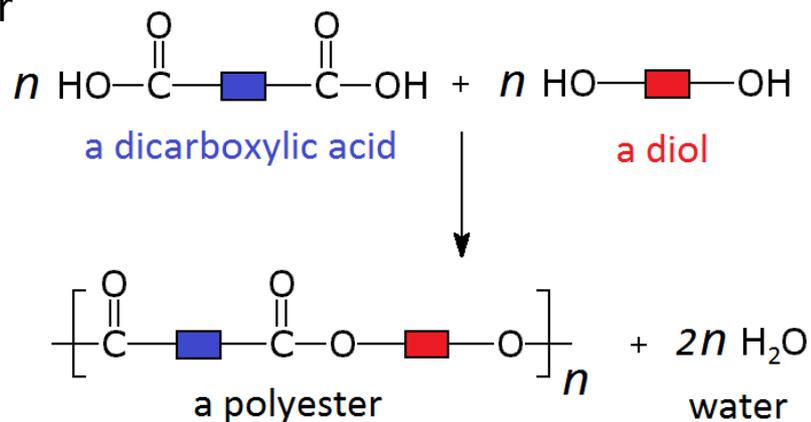
Condensation polymerisation

Condensation polymerisation involves monomers with two functional groups.

When these types of monomers react, they join together, usually losing small molecules such as water, and so the reactions are called condensation reactions.

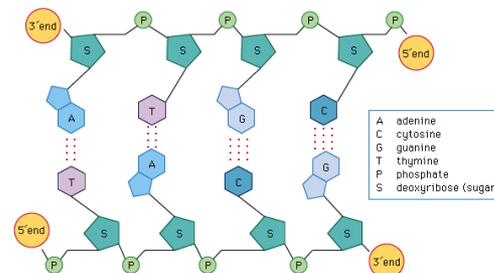
The simplest polymers are produced from two different monomers with two of the same functional groups on each monomer.

For example: ethanediol and hexanedioic acid polymerise to produce a polyester



DNA

DNA (deoxyribonucleic acid) is a large molecule essential for life. DNA encodes genetic instructions for the development and functioning of living organisms and viruses. Most DNA molecules are two polymer chains, made from four different monomers called nucleotides, in the form of a double helix. Other naturally occurring polymers important for life include proteins, starch and cellulose.



T3 – Y10 Chem - C7 Organic chemistry

What is a condensation polymer?

What is lost with condensation polymerisation?

What 2 things form a polyester?

What is a DNA?

What is DNA made of?

Name some other naturally occurring polymers.

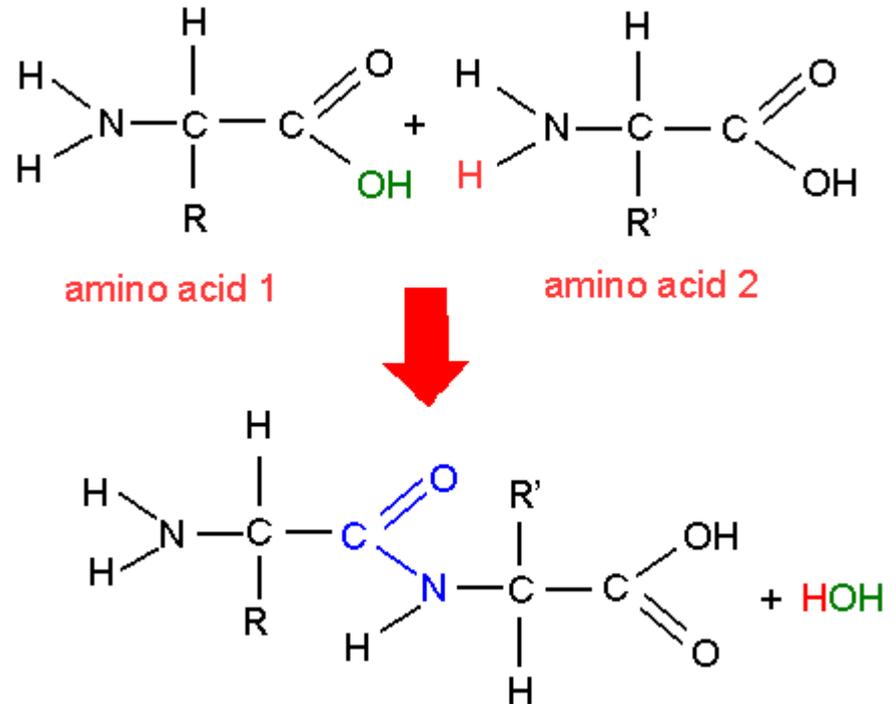
Amino acids

Amino acids have two different functional groups in a molecule.

Amino acids react by condensation polymerisation to produce polypeptides.

For example: glycine is $\text{H}_2\text{NCH}_2\text{COOH}$ and polymerises to produce the polypeptide

Different amino acids can be combined in the same chain to produce proteins.



T3 – Y10 Chem - C7 Organic chemistry

When 2 amino acids react, they form a...

By which process do amino acids form polypeptides?

A long chain of different amino acids combined forms a...

What are the 2 functional groups which combine to form a polypeptide?

P5 – Motion

Distance and Displacement

Distance

- How far an object moves
- Does not involve direction
- Distance = scalar quantity

Displacement

- Includes both the **distance** an object moves, measured in a straight line, from start to finish point and the **direction** of that straight line.
- Displacement = vector quantity

Speed

You should be able to recall the following typical speeds.

Activity	Typical Speed (m/s)
Walking	1.5
Running	3
Cycling	6
A car	25
A train	55
Speed of sound	330

Calculating speed:

$$\text{speed} = \text{distance} \div \text{time}$$

E.g. A car travels 100 metres in 3.8 seconds. What is the average speed?

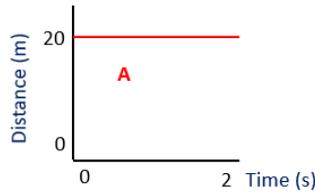
$$v = s/t$$

$$v = 100 \text{ m} / 3.8 \text{ s}$$

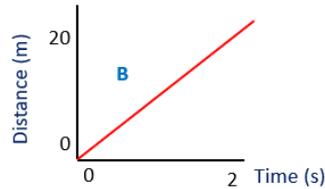
$$v = 26 \text{ m/s}$$

Distance time graphs

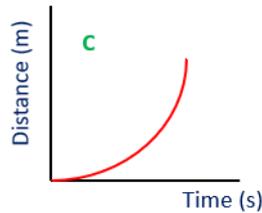
Distance time graphs show the motion of an object
The gradient tells us the speed of the object



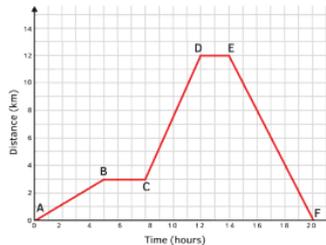
Object is stationary
(distance not changing)



Object is travelling at constant speed
 $v = 20/2$
 $v = 10 \text{ m/s}$



Object is accelerating
(HT only) Speed can be calculated by:
- Drawing a **tangent** and finding the **gradient** of the tangent



A journey generally has different speeds.
Average speed can be calculated by using total distance \div time

Velocity and Acceleration

Velocity & acceleration = vector quantities

1. Velocity = **speed** in a given **direction**
 - positive velocity = forwards (eg +5 m/s)
 - negative velocity = backwards (eg -5 m/s)
2. Acceleration is a **change in velocity**
 - positive acceleration = speeding up
 - negative acceleration = slowing down

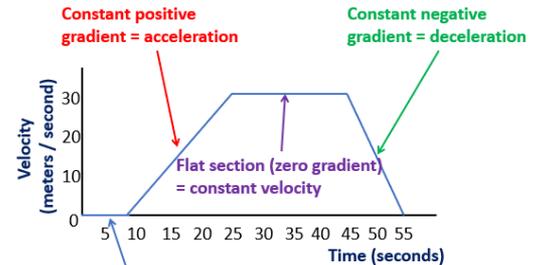
Average acceleration of an object can be calculated using:

$$\text{acceleration} = \frac{\text{final velocity} - \text{initial velocity}}{\text{time taken}}$$

Units for acceleration are m/s^2

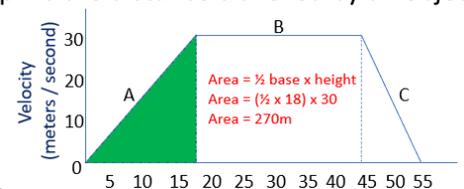
Velocity time graphs

Show how velocity changes during a journey
The gradient shows the acceleration



Flat section along the x-axis (zero gradient) = constant zero velocity

HT only - area underneath a velocity time graph is the distance travelled by an object



P5 – Motion

1. What type of quantity is distance?
2. What is 'displacement'?
3. Why is displacement a vector quantity?

Speed

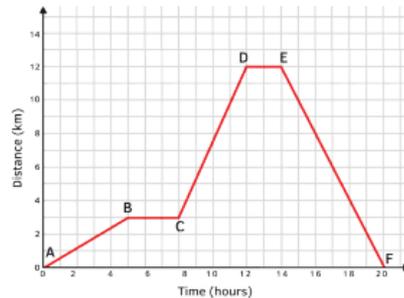
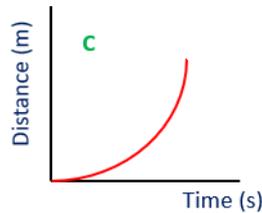
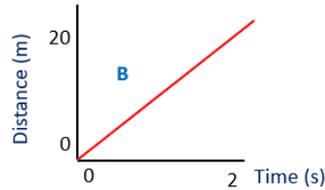
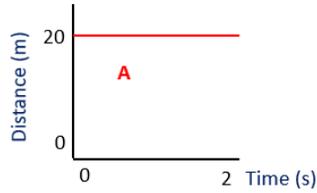
1. Complete the table:

Activity	Typical Speed (m/s)
Walking	
Running	
	6
A car	
	55
Speed of sound	

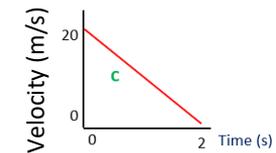
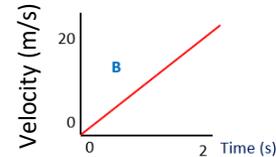
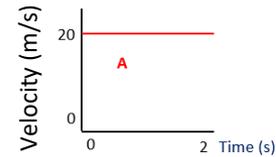
2. What is the equation linking distance, speed and time?

3. What are the units for speed?

1. Describe the motion of the objects:



1. Define velocity and acceleration. Give the units.
2. What does a negative velocity indicate?
3. What does a negative acceleration indicate?
4. What is the equation linking acceleration, final velocity, initial velocity and time?
5. Describe the motion of the objects shown in the graph (include numbers if you can!)



5. How do you calculate acceleration from a velocity time graph?
6. (HT) What does the area under the line on a velocity time graph show?

P5 – Motion– Required Practical - Acceleration

Aim: To investigate the effect of **varying force** on the acceleration of an object of constant mass.

You may be given any of the following apparatus set-ups to conduct these investigations:

Independent variable = force applied

Dependent variable = acceleration

Control variables = mass of toy car and surface car is on.

Method (using toy car)

1) Place the car on a ramp. Incline the ramp until the car just does not move. This is to remove as much of the effect of friction as possible.

2) Set up a light gate at the end of the ramp

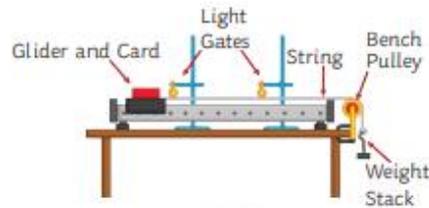
3) Place a 1N weight on the pulley attached to the toy car.

4) Allow the weight to drop and read the acceleration of the car from the light gate

5) Repeat the experiment several times, decreasing the weight on the pulley each time (e.g. 0.8N, 0.6N, 0.4N etc.) Place the removed mass onto the car to keep the mass of the system constant

Results

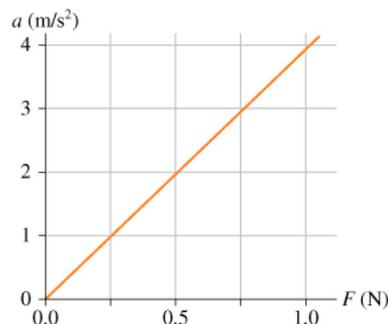
Acceleration is proportional to force applied



or



or



Aim: Investigate the effect of **varying mass** of an object on the acceleration produced by a constant force.

You may be given any of the following apparatus set-ups to conduct these investigations:

Independent variable = mass of glider

Dependent variable = acceleration of glider

Control variables = force applied and surface car is on

Method (using glider)

1) Place the glider on the track. Switch on the air blower and adjust until the glider just doesn't move. This is to remove as much of the effect of friction as possible.

2. Set up a light gate at the end of the air track

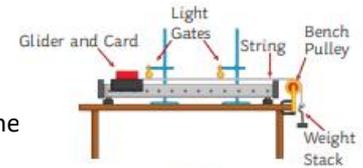
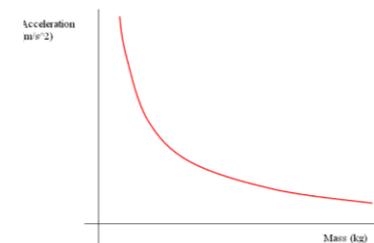
3) Add a 10g mass onto the glider. Place a 1N weight on the pulley attached to the glider and let go.

4) Record the acceleration from the light gate

5) Repeat the experiment several times, increasing the mass on the glider each time (e.g. 20g, 30g, 40g etc.) whilst keeping the weight (1N) on the pulley constant.

Results

Acceleration is inversely proportional to mass



or

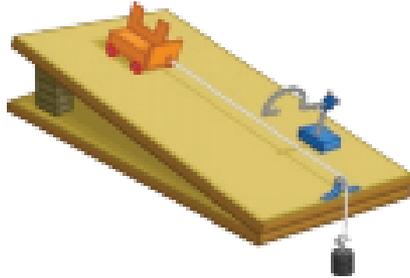


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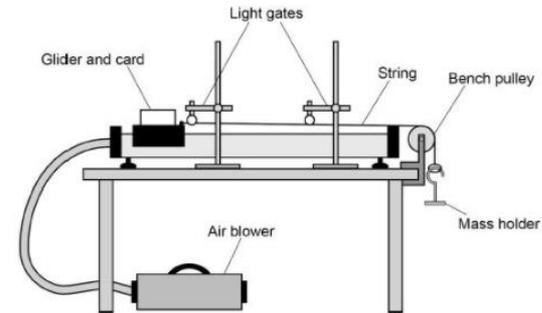
P5 – Motion– Required Practical - Acceleration

A student was investigating the effect of changing the force on the acceleration of a toy car down a ramp, using the equipment shown below:



1. What provides the force for the car to move?
2. Why is the ramp tilted?
3. What is the independent variable in the investigation?
4. What is the dependent variable?
5. How is force changed during the experiment?
6. What is the name of the piece of equipment shown that measures the acceleration?
7. How is mass kept constant throughout the experiment?
8. What relationship do you expect to see between force and acceleration?

A student was investigating the effect of changing the mass of an object on the acceleration, using the equipment shown below



1. What is the independent variable?
2. What is the dependent variable?
2. What variables need to be controlled?
4. Why is the air blower switched on?
5. Describe the relationship you would expect to find between mass and acceleration

P5 Forces and motion

Work done and Energy Transfer

- When a force acts on an object and makes it move – **work is done**.

Work done = energy transferred

Work done is calculated by:

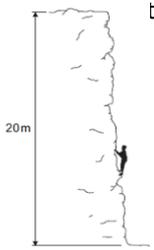
$$\text{work done} = \text{force} \times \text{distance}$$

$$W = F \times s$$

↑ ↑ ↑
 Joules (J) Newtons (N) Metres (m)

- One joule of work is done when a force of one newton causes a displacement of one metre.
- 1 joule = 1 newton-metre

e.g A climber and his gear weigh 750N. Calculate the energy transferred to the top of the cliff



$$W = F s$$

$$W = 750 \times 20\text{m}$$

$$W = 15000\text{J}$$

- Work done against the frictional forces acting on an object causes a rise in the temperature.



Gravity

Weight = the **force** acting on an object due to gravity.

- Gravity close to Earth is due to the gravitational field.
- Weight of an object depends on the gravitational field strength at the point where the object is.

Weight can be calculated using:

weight = mass x gravitational field strength

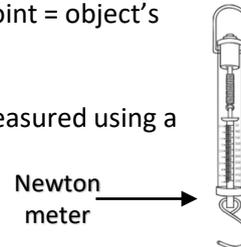
$$W = m \times g$$

↑ ↑ ↑
 Newtons (N) Kilograms (kg) Newtons per kilogram (N/kg)

- Earth's gravitational field strength = 9.8 N/kg

- Weight of an object can be considered to act at a single point = object's 'centre of mass'

- Weight can be measured using a **newton meter**.



Forces and Elasticity

- When work is done on an elastic object (e.g. stretching or compressing a spring), energy is stored as elastic potential energy.

Elastic deformation:

- When force is applied, object changes shape and stretches.
- When the force is no longer applied, object returns to original shape.

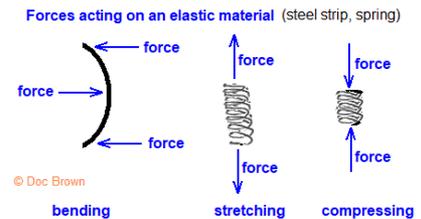
Inelastic deformation = stretched beyond limit – will not return to original shape and size.

Force = spring constant x extension

$$F = k \times e$$

↑ ↑ ↑
 Newtons (N) Newtons per metre (N/m) Metres (m)

Two forces are needed to stretch or compress



Work done in stretching (or compressing) a spring:

elastic potential energy = $0.5 \times \text{spring constant} \times (\text{extension})^2$

$$E_e = \frac{1}{2} \times k \times e^2$$

P5 Forces and motion

- | | |
|--|---|
| <ol style="list-style-type: none">1. What are vector diagrams used to calculate?2. Where do you draw the second force from?3. Two forces act on a boat, pulling it along. The first force is 3N North and the second is 4N East. Follow the rules and draw the forces acting from the point of origin below:4. What is the resultant force on the boat? | <ol style="list-style-type: none">1. When an elastic object is stretched or compressed, which energy store is filled?2. What is 'elastic deformation'?3. What is 'inelastic deformation'?4. What happens to a stretched spring when the force is removed?5. What is the equation linking extension, force and spring constant6. How many forces are needed to stretch or compress an object? |
|--|---|

P5 Forces and motion

Stopping Distance

Stopping distance = thinking distance + braking distance

- Greater the speed of vehicle – greater the stopping distance.

Thinking Distance (reaction time)

Thinking distance = distance travelled before driver reacts and presses brakes.

Reaction times are typically 0.2s to 0.9s

Factors that affect a driver's reaction time:

- Tiredness
- Drugs
- Alcohol
- Age
- Distractions (e.g. phone/music)

Momentum (HT only)

- Defined by the equation:

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$p = m \times v$$

Units:

momentum = kilograms metre per second (kg m/s)

mass = kg

velocity = m/s

- In a closed system, total momentum before an event is equal to the total momentum after the event – this is called **conservation of momentum**.

Braking Distance

Braking distance = the distance travelled by a vehicle once with **brakes are applied** until it reaches a full stop.

It can be affected by:

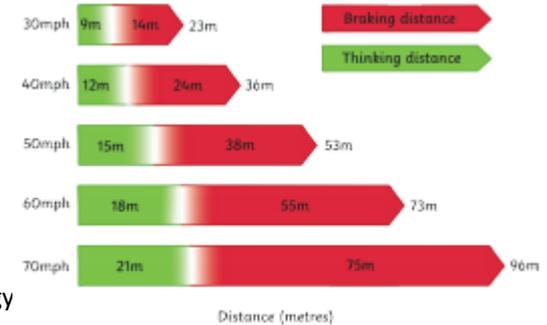
- wet/icy roads
- poor vehicle conditions (brakes/tyres)

When a force is applied to brakes, **work is done** by the friction between the car wheels and the brakes.

Work done – reduces the **kinetic energy store** and energy is transferred to **the thermal store of the brakes**, increasing their temperature.

Increased speed = increased force required to stop the vehicle

Very large decelerations can lead to brakes overheating and/or loss of control of the car.



Newton's First Law

If resultant force acting on object is zero:

- Stationary object will remain stationary
- Moving object will continue at a steady speed and in the same direction.

100N resistance (friction and air) 100N thrust



(HT only) Inertia = tendency of an object to continue in a state of rest or uniform motion (same speed and direction)

Newton's Second Law

Acceleration of an object is proportional to resultant force acting on it and inversely proportional to the mass of the object

$$\text{Resultant force} = \text{mass} \times \text{acceleration}$$

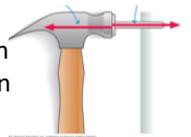
$$F = m \times a$$

(HT only) Inertial mass = how difficult it is to change an object's velocity. Defined as ratio of force over acceleration.

Newton's Third Law

When two objects interact, forces acting on each other are always equal and opposite.

e.g. a hammer hitting a nail
The hammer exerts a force on the nail, and the nail exerts an equal and opposite force on the hammer.



P5 Forces and motion

1. What is stopping distance?

2. What is the equation linking braking distance, stopping distance and thinking distance?

3. What is the typical reaction time range of a human?

4. What factors may affect a driver's reaction time?

1. What is the equation linking mass, momentum and velocity?

2. What are the units for momentum?

3. What happens to total momentum during a collision or explosion?

1. What is 'braking distance'?

2. What factors affect braking distance?

3. Describe the energy transfers when brakes are applied to stop a moving car

4. Why are large decelerations dangerous?

1. What happens to a stationary object when the resultant force acting on the object is zero?

2. What happens to a moving object when the resultant forces are zero?

3. (HT) What is inertia?

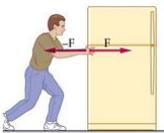
1. State Newton's second law.

2. What is the equation linking acceleration, force and mass?

3. What is inertial mass? (HT)

1. State Newton's third law.

2. Describe the forces acting in the picture



P5 Forces and motion

Using conservation of momentum

As long as no external forces are acting on the objects involved, the total momentum stays the same in explosions and collisions. We say that momentum is conserved.

Example:

Two railway carriages collide and move off together. Carriage A has a mass of 12,000 kg and moves at 5 m/s before the collision. Carriage B has a mass of 8,000 kg and is stationary before the collision. What is the velocity of the two carriages after the collision?

Step 1

Work out the total momentum before the event (before the collision):

$$p = m \times v$$

$$\text{Momentum of carriage A before} = 12,000 \times 5 = 60,000 \text{ kg m/s}$$

$$\text{Momentum of carriage B before} = 8,000 \times 0 = 0 \text{ kg m/s}$$

$$\text{Total momentum before} = 60,000 + 0 = 60,000 \text{ kg m/s}$$

Step 2

Work out the total momentum after the event (after the collision):

$$\text{Because momentum is conserved, total momentum afterwards} = 60,000 \text{ kg m/s}$$

Step 3

Work out the total mass after the event (after the collision):

$$\text{Total mass} = \text{mass of carriage A} + \text{mass of carriage B} = 12,000 + 8,000 = 20,000 \text{ kg}$$

Step 4

Work out the new velocity:

$$p = m \times v, \text{ but we can rearrange this equation so that } v = p \div m$$

$$\text{Velocity (after the collision)} = 60,000 \div 20,000 = 3 \text{ m/s}$$

P5 Forces and motion

1. What is momentum conservation?
2. Two bikes carriages collide and move off together. Bike 1 has a mass of 300 kg and moves at 3 m/s before the collision. Bike 2 has a mass of 200 kg and is stationary before the collision. What is the velocity of the two carriages after the collision?

P5 Forces and pressure

Pressure

- Pressure is the force per unit area. The force is normal to the surface.
- The unit of pressure is Pascal (Pa), $1 \text{ Pa} = \text{N/m}^2$

Pressure can be calculated using:

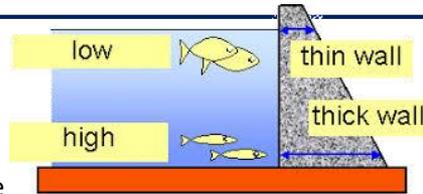
$$\text{Pressure} = \text{Force} \div \text{area}$$

$$P = F / A$$

Pascal (Pa) ← P ← Newtons (N) ← F ← Metre² (m²) ← A

Pressure in liquids

- The pressure in a liquid increase with depth.
- A liquid flows until the pressure along the same horizontal level is constant.



- The pressure in a liquid depends on the density of the liquid. The greater the density the greater the pressure in the liquid.

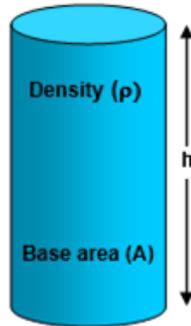
- Pressure in a liquid also depends on the height of the column of liquid and the gravitational field strength the liquid is in.

Pressure on a liquid can be calculated using:

$$\text{Pressure} = \text{height} \times \text{density} \times \text{gravitational field strength}$$

$$P = h \times \rho \times g$$

Pascal (Pa) ← P ← metres (m) ← h ← Kilograms per metre³ (m³) ← ρ ← Newtons per kilogram (N/kg) ← g



Atmospheric Pressure

- Atmospheric pressure is caused by air molecules colliding with surfaces.
- Atmospheric pressure decreases with altitude because there is less air at higher altitudes.
- The density of the atmosphere decreases with increasing altitude.

Particles will move from areas of high pressure to areas of low pressure. An object between different pressure will experience a force e.g. the pressure inside the cabin of an aircraft is higher than the atmospheric pressure outside, therefore the aeroplane window experiences a force due to this pressure difference.



The force on a flat object due to pressure difference can be calculated using:

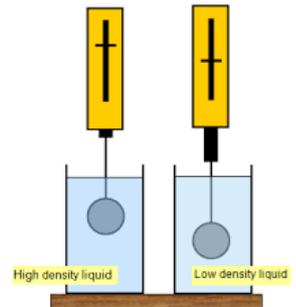
$$\text{Force} = \text{pressure difference} \times \text{area of the surface}$$

Newtons (N) ← F ← Pascal (Pa) ← P ← Metre² (m²) ← A

Upthrust and Flotation

- Upthrust is an upward force on an object due to the fluid it is in, it is caused by the pressure of the fluid.

- The pressure at any point in a fluid depends on the density of the fluid and the depth of the fluid at that point.
- An object sinks if its weight is greater than the upthrust on it when its fully immersed.



P5 Forces and pressure

1. What is the unit for pressure?

2. What is the equation that links area, force and pressure?

1. What happens to the pressure in a liquid as the depth increase?

2. How does the density of a liquid affect the pressure in the liquid?

3. What factors affect the pressure in a liquid?

4. What equation is used to find the pressure in a liquid?

1. What causes atmospheric pressure?

2. What is the relationship between atmospheric pressure and altitude?

3. What is the relationship between the density of the atmosphere and altitude?

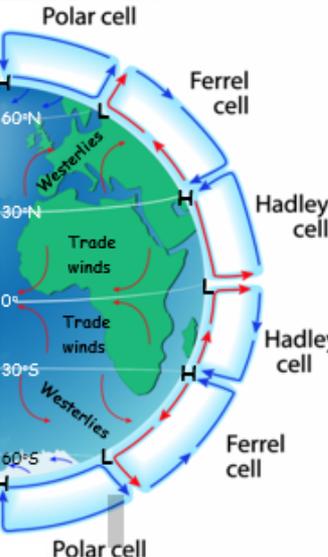
4. How do calculate the force on a flat surface due to a difference in pressure?

1. What is upthrust?

2. When will an object sink?



9. Global atmospheric circulation

Factor	Explanation
Global atmospheric circulation	Worldwide system of winds, which transport heat from the equator to the poles. Wind is large scale movement of air from HIGH to LOW pressure.
Key information	This is caused by differences in temperature at the Equator and the poles. The circulation is divided into loops called CELLS. Low pressure = Rising air = Rain. High pressure = Sinking air = Clear skies.
	At the poles, cool air sinks creating high pressure. (<250mm rainfall).
	At 60°N air rises between the <u>Ferrel</u> and Polar cell creating an area of low pressure. The UK gets lots of <u>low pressure</u> weather blown in from the Atlantic.
	At 30°N air sinks between the <u>Ferrel</u> /Hadley cell creating high pressure (deserts <250mm rain).
	On the equator air rises as the sun's heat is most concentrated. This creates a <u>low pressure</u> area with high rainfall. (Rainforests >2000mm of rain).
	Surface winds blow towards the equator (trade winds). Direct hurricanes to west.
	Here winds blow towards the poles and are called Westerlies. (From the west).
	The winds curve due to the spin of the earth (Coriolis effect).

10. Weather hazards in the UK

Hazard	Example
Extreme weather	A weather event that is significantly different from the average pattern and is especially severe or unseasonal.
Strong winds	Damage property / disrupt transport. 2018 Storm Ali killed 2 people.
Heavy rain	Can cause flooding, costing millions. Cockermouth 2009 314 mm in 24 hrs.
Snow	Injury, death, travel disruption. March 2018 Beast from East. 50 cm.
Drought	Crop failure, rules to conserve water. April 10-March 12 only 75% of rain.
Heatwaves	Pollution builds up- breathing problems. Death. BUT tourism benefits. 2018.

12. An example of a recent extreme weather event in the UK

Name	Somerset Floods, 2014
Causes	350mm rain fell in Jan and Feb High tides, rivers not dredged for 20 yrs
Impacts	<ol style="list-style-type: none"> £10 million damage 14,000 ha of farmland flooded 600 homes flooded Moorland and <u>Muchelney</u> cut-off Floodwaters contaminated Soil damaged for 2 years after
Management strategies	Immediate responses <ul style="list-style-type: none"> Army helped with rescue boats Volunteers and community groups Locals used boats to go shopping/school Long term responses <ul style="list-style-type: none"> £20 million flood action plan Rivers dredged Road levels raised Tidal barrage by 2024

11. Evidence that weather is becoming more extreme...

Our weather is naturally variable BUT extreme events are becoming more common and severe.

Hazard	Example
Temperature	10 warmest yrs all occurred since 1990 2018 joint hottest summer on record. Dec 2010 coldest month for 100 years.
Rainfall	More rainfall records broken between 2010 - 2014 than in any other decade. Dec 2015 wettest month on record.



9. Global atmospheric circulation	
Factor	Explanation
Global atmospheric circulation	
Key information	
<p>The diagram illustrates the three-cell model of global atmospheric circulation. It shows the Earth with latitude lines at 60°N, 30°N, 0° (Equator), 30°S, and 60°S. The Polar cell is located between the poles and 60° latitude, with air sinking at the poles and rising at 60° latitude. The Ferrel cell is between 60° and 30° latitude, with air sinking at 30° latitude and rising at 60° latitude. The Hadley cell is between the equator and 30° latitude, with air sinking at 30° latitude and rising at the equator. Wind patterns include Westerlies between 30° and 60° latitude and Trade winds between the equator and 30° latitude. High (H) and Low (L) pressure systems are indicated at the boundaries of the cells.</p>	

10. Weather hazards in the UK	
Hazard	Example
Extreme weather	
Strong winds	
Heavy rain	
Snow	
Drought	
Heatwaves	

11. Evidence that weather is becoming more extreme...	
Temperature	

12. An example of a recent extreme weather event in the UK	
Name	
Causes	
Impacts	
Management strategies	



13. Tropical storms

Hurricanes, cyclones, typhoons. An area of low pressure with winds moving in a spiral around the calm central point called the eye of the storm. Winds are powerful and rainfall is heavy.

Factor	Explanation
Global distribution	5° – 30° north and south of equator (sea temp warm, wind shear low). More in the northern hemisphere. Move towards the west.
Relationship with ACM	Trade winds (from high to low pressure) send tropical storms to west.
Structure	Circular, can be 100s of km wide. Eye- calm in centre (air ↓, LOW). Eyewall- strong winds, torrential rain. Edges- Wind speed falls, rain reduces.



How will climate change affect them?

Distribution	Increase to higher latitudes (warmer sea temperatures).
Frequency	Number could increase. (Longer season)
Intensity	Stronger? More evaporation.

14. Formation of tropical storms

Include processes and ensure correct sequence.

Conditions	5-30° latitude. Ocean depth > 60m deep. Sea temperature > 27°C. Form summer and autumn.
------------	--

1. Sun heats the ocean (27°C) > **rapid evaporation**.
2. **Condensation** occurs quickly leading to a large amount of cloud forming (**tropical depression**).
3. Due to the earth's rotation, this cloud mass starts to spin. An eye is formed in the centre.
4. Due to rising air, a **low pressure** area forms below. Air rushes into this creating high wind speeds. (>74mph = **tropical storm**)
5. The **low pressure** results in the ocean being uplifted forming a **storm surge**.

15. How can we reduce the impacts?

Strategy	Explanation
Prediction / monitoring	Satellites and aircraft to monitor storms. Computer models calculate the predicted track. Allows warnings so people can evacuate or protect their home.
Planning	New developments avoid high risk areas. Emergency services train and prepare. Plan evacuation routes. Reduces the injuries and deaths.
Protection	Building design- reinforced concrete, stilts to reduce flood risk. Flood defences along rivers and coasts. Reduces the number of buildings destroyed so fewer injuries and deaths.

16. Tropical storms affect people and environments.

	Generic	Typhoon Haiyan 2013 Philippines
Primary effects	Direct results of strong winds, high rainfall, storm surges. Flooding, buildings destroyed, death.	<ul style="list-style-type: none"> † 6,201 deaths. (Most drowned in storm surge.) † 1.1 million houses damaged. ⚡ 90% of Tacloban city destroyed.
Secondary effects	Homelessness > lead to poor health. Lack of sanitation > diseases (cholera) Food shortages, price increase.	<ul style="list-style-type: none"> † 4.1 million homeless. ⚡ Damage cost US\$12 billion. ⚡ 1.1 million tonnes of crops destroyed (rice).
Immediate responses	Evacuate before the storm. Rescue those affected. Provide food, water, blankets. Aid workers arrive from abroad. Recover dead bodies (prevent disease).	<ul style="list-style-type: none"> ➢ Over 1200 evacuation shelters set up. ➢ Philippines Red Cross delivered basic food aid. ➢ UK sent shelter kits. ➢ 800,000 evacuated (warnings given 2 days early).
Long term responses	Repair homes and infrastructure. Promote economic recovery.	<ul style="list-style-type: none"> ➢ More cyclone shelters built. ➢ No build zones. ➢ 'Cash for work' programmes.



13. Tropical storms	
Factor	Explanation
Global distribution	
Relationship with ACM	
	
How will climate change affect them?	
Distribution	
Frequency	
Intensity	

14. Formation of tropical storms	
Conditions	

15. How can we reduce the impacts?	
Strategy	Explanation
Prediction / monitoring	
Planning	
Protection	

16. Tropical storms affect people and environments.		
	Generic	Typhoon Haiyan 2013 Philippines
Primary effects		<ul style="list-style-type: none"> ↓ ⊖
Secondary effects		<ul style="list-style-type: none"> ↓ ⊖
Immediate responses		<ul style="list-style-type: none"> ➤ ➤ ➤ ➤
Long term responses		<ul style="list-style-type: none"> ➤ ➤ ➤

What we are learning this term:
 3.1 Ideas about the cause of disease and illness
 3.2 Approaches to treatment and prevention
 3.3 Key Individuals and fighting cholera in London, 1854

A.	Can you define these key words?
microbes	Any living organism that is too small to see without a microscope. Microbes include bacteria.
vaccination	Treatment with a vaccine to produce immunity against a disease
spontaneous generation	Claimed rotting matter created microbes.
bacteriology	The study of bacteria.
inoculate	Deliberately infecting yourself with a disease to avoid a more severe case later on.

C. Fighting cholera in London , 1854 (3.3)

What is Cholera?	Cholera was a terrible water borne disease that spread quickly across England from 1831. There were lots of cases in slum dwellings.
Attempts to prevent it	Some steps were taken to clean up the filthiest areas of the city. Idea that it was caused by miasma was widespread, so local councils focused on cleaning up the mess in which they were living
John Snow	John Snow was surgeon who investigated the 1854 epidemic. He created a spot map to show the deaths and noticed they were concentrated around a water pump in Broad Street, SoHo. Clear the water pump was the source of the outbreak
Impact of Snows work	In the short-term Snow removed the handle from the Broad Street pump and the deaths in that area went away. Long-term Snow presented his work to the government arguing clean water needed to be supplied. Many rejected his work and clung to the idea of miasma causing cholera

B. Change and continuity in ideas about disease and illness in the 18th and 19th Century. (3.1-3.2)		
<u>Causes</u>	<u>Prevention</u>	<u>Treatments</u>
Religion – People no longer believed that God was responsible for illnesses and world events	Vaccinations – the work of Edward Jenner in the 18 th century led to the first vaccination being created for smallpox. This led the way to other vaccinations being produced as Pastuer and Robert Koch isolated microbes which caused certain diseases	Continuance – despite the new ideas about the cause of disease and illness in the 18 th century, it took a while for medical science to catch up. Not a great deal of understanding how to remove germs as part of treatment
Age of Enlightenment/Scientific Revolution – people started to look for answers in the world about disease and illness. There was also great change across science influencing ideas about cause	Public Health Act 1875 – in the 18 th Century the government had a very <i>laissez-faire</i> attitude to public health. This changed when more men could vote. The government realised changes were needed and passed the Public Health Act. This Act stated that clean water, sewage system, public parks, housing officers and street lighting had to be provided	Hospitals – Florence Nightingale was a pioneer in changing hospitals and hospital care in the 19 th Century. Following her success at the war hospital in the Crimea, Nightingale changed the way that hospitals were designed to having separate wards and more ventilation. Also set up a training school for nurses to give better care
Miasma – people still believed in the theory that disease and illness was caused by harmful fumes in the air. BUT it was becoming less popular	Role of the government – Took a more active role in preventing disease, making smallpox vaccinations compulsory	Anaesthetics – one of the big problems in the 18 th and 19 th centuries was pain during surgery. Ether and laughing gas had been used but they were not good enough. John Simpson discovered that chloroform could be used as a pain relief – this led to more complex surgeries being performed
Spontaneous Generation – this theory stated that rotting matter caused bacteria to form, causing people to get ill		Antiseptics – another big problem with surgery was infections. Joseph Lister built on Pasteur's work and discovered that carbolic acid could be used to prevent infections. Used on wounds and Sterilised equipment, but some surgeons did not like the change
Germ Theory – this correct theory put forward by Louis Pastuer was that germs caused matter to rot. He linked this to disease and illness, stating that germs caused people to get ill		

D. Key People (3.3)

Edward Jenner	John Snow	Edwin Chadwick
Country doctor who realised that milkmaids who got cowpox did not catch smallpox – decided they must be connected. Tested his theory by infecting a local boy with cowpox and then tried to infect him with smallpox but he did not get ill. Wrote up his findings to make sure doctors could follow. Had successfully developed the first vaccine, which was supported by the government.	Used scientific methods to prove that cholera was a water borne disease in the 1850's. Snow presented his findings to the government, recommending that the sewer systems were improved, which they were eventually.	Published his <i>Report on the Sanitary Conditions of the Labouring Classes</i> in 1842. he spent time researching the urban poor and discovered that people living in cities had a lower life expectancy than people living in the countryside. Campaigned for all cities to set up boards of health, responsible for clean water and disposing sewage.

What we are learning this term:
 3.1 Ideas about the cause of disease and illness
 3.2 Approaches to treatment and prevention
 3.3 Key Individuals and fighting cholera in London, 1854

A.	<i>Can you define these key words?</i>
microbes	
vaccination	
spontaneous generation	
bacteriology	
inoculate	

C.	Fighting cholera in London , 1854 (3.3)
What is Cholera?	
Attempts to prevent it	
John Snow	
Impact of Snows work	

B. Change and continuity in ideas about disease and illness in the 18th and 19th Century. (3.1-3.2)		
<u>Causes</u>	<u>Prevention</u>	<u>Treatments</u>

D. Key People (3.3)		
Edward Jenner	John Snow	Edwin Chadwick

GCSE History : Medicine in 18th and 19th Century Britain

What we are learning this term:
3.1 Ideas about the cause of disease and illness
3.2 Approaches to treatment and prevention
3.3 Key Individuals and fighting cholera in London, 1854

A.	Can you define these key words?
microbes	Any living organism that is too small to see without a microscope. Microbes include bacteria.
vaccination	Treatment with a vaccine to produce immunity against a disease
spontaneous generation	Claimed rotting matter created microbes.
bacteriology	The study of bacteria.
inoculate	Deliberately infecting yourself with a disease to avoid a more severe case later on.

C.	Fighting cholera in London , 1854 (3.3)
What is Cholera?	Cholera was a terrible water borne disease that spread quickly across England from 1831. There were lots of cases in slum dwellings.
Attempts to prevent it	Some steps were taken to clean up the filthiest areas of the city. Idea that it was caused by miasma was widespread, so local councils focused on cleaning up the mess in which they were living
John Snow	John Snow was surgeon who investigated the 1854 epidemic. He created a spot map to show the deaths and noticed they were concentrated around a water pump in Broad Street, SoHo. Clear the water pump was the source of the outbreak
Impact of Snows work	In the short-term Snow removed the handle from the Broad Street pump and the deaths in that area went away. Long-term Snow presented his work to the government arguing clean water needed to be supplied. Many rejected his work and clung to the idea of miasma causing cholera

B. Change and continuity in ideas about disease and illness in the 18th and 19th Century. (3.1-3.2)		
<u>Causes</u>	<u>Prevention</u>	<u>Treatments</u>
Religion – People no longer believed that God was responsible for illnesses and world events	Vaccinations – the work of Edward Jenner in the 18 th century led to the first vaccination being created for smallpox. This led the way to other vaccinations being produced	Continuance – despite the new ideas about the cause of disease and illness in the 18 th century, treatments to remove germs took longer to find
Miasma – people still believed in the theory that disease and illness was caused by harmful fumes in the air. BUT it was becoming less popular	Public Health Act 1875 – in the 18 th Century the government did not care much about public health. This changed when more men could vote. The government realised changes were needed and passed the Public Health Act. This Act stated that clean water, sewage system, public parks and street lighting had to be provided	Hospitals – Florence Nightingale helped to change hospitals and nursing. Nightingale changed the way that hospitals were designed to having separate wards and more ventilation. Also set up a training school for nurses to give better care
Spontaneous Generation – this theory stated that rotting matter caused bacteria to form, causing people to get ill	Role of the government – Took a more active role in preventing disease, making smallpox vaccinations compulsory	Anaesthetics – one of the big problems in the 18 th and 19 th centuries was pain during surgery. Ether and laughing gas had been used but they were not good enough. John Simpson discovered that chloroform could be used as a pain relief – this led to more complex surgeries being performed
Germ Theory – this correct theory put forward by Louis Pastuer was that germs caused matter to rot. He linked this to disease and illness, stating that germs caused people to get ill		Antiseptics – another big problem with surgery was infections. Joseph Lister built on Pasteur's work and discovered that carbolic acid could be used to prevent infections. Used on wounds and Sterilised equipment, but some surgeons did not like the change

D. Key People (3.3)		
Edward Jenner	John Snow	Edwin Chadwick
Country doctor who realised that milkmaids who got cowpox did not catch smallpox – decided they must be connected. Tested his theory by infecting a local boy with cowpox and then tried to infect him with smallpox but he did not get ill. Had successfully developed the first vaccine, which was supported by the government.	Used scientific methods to prove that cholera was a water borne disease in the 1850's. Snow presented his findings to the government, recommending that the sewer systems were improved, which they were eventually.	Published his <i>Report on the Sanitary Conditions of the Labouring Classes</i> in 1842. He spent time researching the poor in cities and discovered that people living in cities had a lower life expectancy than people living in the countryside. Asked for boards of health to be set up to make cities cleaner.

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C. Fighting cholera in London , 1854 (3.3)

What is Cholera ?
 Cholera was a terrible _____ disease that spread quickly across England from _____. There were lots of cases in _____ dwellings.

Attempts to prevent it
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John Snow
 John Snow was _____ who investigated the 1854 epidemic. He created a _____ to show the deaths and noticed they were concentrated around a water pump in _____. SoHo. Clear the water pump was the source of the outbreak

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B. Change and continuity in ideas about disease and illness in the 18th and 19th Century. (3.1-3.2)

<u>Causes</u>	<u>Prevention</u>	<u>Treatments</u>
Religion – _____	Vaccinations – the work of _____ in the 18 th century led to the first vaccination being created for _____. This led the way to other vaccinations being produced	Continuance – despite the new ideas about the cause of disease and illness in the 18 th century, _____ took longer to find
Miasma – people still believed in the theory that _____ was caused by harmful fumes in the air. BUT it was becoming _____	Public Health Act 1875 – in the 18 th Century the government did not care much about _____. This changed when more men could vote. The government realised changes were needed and passed the _____. This Act stated that clean _____, _____, public parks and street lighting had to be provided	Hospitals – _____ helped to change hospitals and nursing. Nightingale changed the way that hospitals were _____ to having separate wards and more _____. Also set up a _____ for nurses to give better care
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Germ Theory – this correct theory put forward by _____ was that germs caused matter to rot. He linked this to _____ and illness, stating that _____		Antiseptics – another big problem with surgery was _____ Joseph _____ built on Pasteur's work and discovered that _____ could be used to prevent infections. Used on wounds and Sterilised _____, but some surgeons did not like the change

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Keywords		What we are learning in this unit		B.	The 5 Pillars - Salah
Tawalla	Showing love for God and for those who follow Him	A. The 5 Pillars and 10 Obligatory Acts B. Salah C. Sawm D. Zakah E. Hajj F. Jihad G. Id-ul-Adha H. Id-ul-Fitr		What is it?	<ul style="list-style-type: none"> • “Salah is a prescribed duty that has to be performed at the given time by the Qur’an” • Muslims pray 5 times per day and this allows them to communicate with Allah. • The prayers are done at dawn (fajr), afternoon (zuhr), late afternoon (asr), dusk (maghrib) and night (isha) • Muslims face the holy city of Makkah when paying.
Tabarra	Disassociation with God’s enemies	A.	5 Pillars of Islam and 10 obligatory acts	Wuzu	<ul style="list-style-type: none"> • The washing process to purify the mind and body for prayer • Muhammad said the key to Salah is cleanliness • Hands, arms, nose, mouth, head, neck and ears are cleaned as well as both feet up to the ankle.
Khums	The obligation to pay one-fifth of acquired wealth	What are the 5 pillars	<ul style="list-style-type: none"> • 5 key practices or duties for Muslims • Both Sunni and Shi’a keep these (Shi’a have them as part of the 10 obligations) • They are seen as pillars “holding up the religion” and are all of equal importance 	Rak’ahs and recitations	<ul style="list-style-type: none"> • These are the movements that Muslims make during prayer • Takbir – raise hands to ears and say 'Allahu Akbar' • Qiyam – Standing, Muslims recite Surah • Then bow to the waist saying “Glory be to my Great Lord and praise be to Him” • Then sink to their knees saying “Glory be to my Lord, The Most Supreme...”
Lesser jihad	The physical struggle or holy war in defence of Islam	What are the 10 obligatory acts	<ul style="list-style-type: none"> • There are 10 obligations for a Muslim according to the Shi’a branch of Islam. • These include prayer, fasting, almsgiving, pilgrimage, jihad, khums, directing others towards good, forbidding evil, tawalla and tabarra 	Salah at home	<ul style="list-style-type: none"> • Salah is a big part of family life • Meals and other activities are usually scheduled to fit around prayer times • Families pray all together and might have a room set aside for prayer
Greater jihad	The daily struggle and inner spiritual striving to live as a Muslim	Shahadah	<ul style="list-style-type: none"> • Shahadah is the first of the 5 pillars • It is the Muslim declaration of faith • “there is no God but Allah, and Muhammad is His messenger” • This is a statement that Muslims reject anything but Allah as their focus of belief • It also recognises that Muhammad has an important role and his life is an example to follow 	Salah in the mosque	<ul style="list-style-type: none"> • All mosques have a qiblah wall which is to show where to face Makkah • Men and women pray in separate rooms at the Mosque
Sunni	Muslims who believe in the successorship of Abu Bakr, Umar, Uthman and Ali as leaders after the Prophet Muhammad			Jumma	<ul style="list-style-type: none"> • Jumma is congregational prayer held on a Friday at the mosque where the imam leads the prayer • Praying together as a community develops the feeling of unity amongst Muslims • Men are obliged to attend unless they are sick or too old • Women do not have to go – they may pray at home instead
Shi’a	Muslims who believe in the Imamah, leadership of Ali and his descendants			Differences between Sunni and Shi’a	<ul style="list-style-type: none"> • Shi’a Muslims combine some prayers so they may only pray 3x a day • Shi’a use natural elements e.g. clay where their head rests
Niyah	Intention during prayer - having the right intention to worship God				
Du’a	A personal prayer that is done in addition to Salah e.g. asking Allah for help				
		<i>Jihad</i>			
Lesser Jihad		<ul style="list-style-type: none"> • Originated when Prophet Muhammad and early Muslims were being attacked and oppressed by the Meccans and had no choice but to engage • “Fight in the way of God those who fight against you but do not transgress” • Conditions for declaration <ul style="list-style-type: none"> • self-defense • proportionate • legitimate authority • no harm to civilians 			
Greater Jihad		<ul style="list-style-type: none"> • A struggle within oneself to follow the teachings of Islam and be a better person • e.g. perform the Five Pillars, follow Sunnah and avoid temptation • “encourage what is right and forbid what is wrong” 			



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Tabarra				A.	5 Pillars of Islam and 10 obligatory acts	Wuzu	
Khums				What are the 5 pillars		Rak'ahs and recitations	
Lesser jihad				What are the 10 obligatory acts		Salah at home	
Greater jihad				Shahadah		Salah in the mosque	
Sunni				<i>Jihad</i>		Jummah	
Shi'a						Lesser Jihad	
Niyah						Greater Jihad	
Du'a		Differences between Sunni and Shi'a					



The 5 Pillars - Zakah	
The role of giving alms	<ul style="list-style-type: none"> • Muslims believe it is their duty to ensure Allah's wealth has been distributed equally as everyone is the same • The Qur'an commands to give to those in need
The significance of giving alms	<ul style="list-style-type: none"> • Giving 2.5% of savings/wealth to charity • Wealth can cause greed which is evil, so Zakah purifies wealth – wealth is given by God and must be shared • The Prophet Muhammad practiced Zakah as a practice in Medina • Given to the poor, needy and travellers • Sadaqah is giving from the heart out of generosity and compassion
Khums	<ul style="list-style-type: none"> • Shi'a Islam – one of the 10 obligatory acts • 20% of any profit earned by Shi'a Muslims paid as a tax • Split between charities that support Islamic education and anyone who is in need • "know that whatever of a thing you acquire, a fifth of it is for Allah, for the Messenger, for the near relative, and the orphans, the needy, and the wayfarer"

The 5 Pillars - Sawm	
The role of fasting	<ul style="list-style-type: none"> • Fasting during Ramadan (9th month in Muslim calendar) • Muslims give up food, drink, smoking and sexual activity in daylight hours • Pregnant people, children under 12, travellers and elderly people are exempt from fasting.
The significance of fasting	<ul style="list-style-type: none"> • Ramadan is believed to be the month that Prophet Muhammad began to receive revelations of the Qur'an • Helps Muslims to become spiritually stronger
Reasons for fasting	<ul style="list-style-type: none"> • Obeying God and exercising self-discipline • Develops empathy for the poor • Appreciation of God's gifts • Giving thanks for the Qur'an • Sharing fellowship and community with other Muslims
Night of power	<ul style="list-style-type: none"> • The night when the Angel Jibril first appeared to Muhammad and began revealing the Qur'an. • The most important event in history – "better than a thousand months" [Surah 97:3] • Laylat Al-Qadr is the holiest night of the year. Muslims try to stay awake for the whole night to pray and study for the Qur'an

The 5 Pillars - Hajj	
The role of pilgrimage	<ul style="list-style-type: none"> • A pilgrimage to Makkah which is compulsory for Muslims to take at least once as long as they can afford it and are healthy
The significance of pilgrimage	<ul style="list-style-type: none"> • God told Ibrahim to take his wife and son on a journey and leave them without food or water • Hajira ran up and down two hills in search of water, could not find any and prayed to God. Then water sprung from the ground. This is the Zamzam well • When Ibrahim returned he was commanded to build the Ka'ba as a shrine dedicated to Allah • Hajj is performed in the month of Dhu'l-Hijja
Actions	<ul style="list-style-type: none"> • Ihram – dressing in two pieces of white cloth • Circling the Ka'aba 7 times (tawaf) • Drinking water from the Zamzam well like Hajar • walking between Al-Safa and Al-Marwa hills seven times • Throwing stones at 3 pillars (jamarat) to represent casting out the devil and remembering Ibrahim throwing stones at the devil to drive him away • Asking Allah for forgiveness at Mt Arafat • Collecting pebbles at Muzdalifah

Id-ul-Adha, Id-ul-Fitr, Ashura	
Id-ul-Adha Not an official holiday in UK	<ul style="list-style-type: none"> • Festival of sacrifice • Marks the end of Hajj and is a chance for whole Ummah to celebrate • Origins – Ibrahim's commitment to God in being willing to sacrifice his son, Ishmael. God was testing Ibrahim • Key events – new clothes, sacrificing an animal, visiting the Mosque. • People ask a butcher to slaughter a sheep for them and share the meat with the community
Id-ul-Fitr Public holiday in Muslim majority countries, not UK	<ul style="list-style-type: none"> • Festival of fast-breaking • Marks the end of Ramadan • Key events – Decorate homes with colourful light and banners, dress in new clothes, gather in Mosques, give gifts and money, give to the poor • Zakah ul-Fitr – donation to the poor so that everyone can eat a generous meal at the end of Ramadan.
Ashura	<ul style="list-style-type: none"> • Sunni celebration – many fast on this day which was established by Prophet Muhammad • Shi'a mourning – Husayn was murdered and beheaded. Muslims remember his death and betrayal • Key events – public displays of grief, day of sorrow, wear black, re-enactments of martyrdom, not a public holiday in Britain but Muslims may have day off school



<i>The 5 Pillars - Zakah</i>	
The role of giving alms	
The significance of giving alms	
Khums	

<i>The 5 Pillars - Sawm</i>	
The role of fasting	
The significance of fasting	
Reasons for fasting	
Night of power	

<i>The 5 Pillars - Hajj</i>	
The role of pilgrimage	
The significance of pilgrimage	
Actions	

<i>Id-ul-Adha, Id-ul-Fitr, Ashura</i>	
Id-ul-Adha Not an official holiday in UK	
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Ashura	

GCSE Unit 10 SPANISH Knowledge organiser.
Topic Life at School and College

What we are learning this term:

- A. Talking about your school and daily routine
- B. Talking about school rules and uniform
- C. Translating into English
- D. Revising 'se debe', 'hay que', 'tener que'
- E. Using questions to help your answer
- F. Using quantifiers and intensifiers

6 Key Words for this term

- | | |
|----------------|----------------------|
| 1. acabar de | 4. demostrar |
| 2. actuar | 5. las instalaciones |
| 3. la ausencia | 6. el maquillaje |

10.1F Las reglas y el uniforme

la agenda	diary, planner
el apellido	surname
el artículo	article
la ausencia	absence
buscar	to look for
el chicle	chewing gum
el daño	harm
dejar	to let, allow
demostrar	to show, demonstrate
el edificio	building
escolar	school (adj.)
firmar	to sign
el individuo	individual
las instalaciones	facilities
el intercambio	exchange
llevar	to take, carry, wear
el maquillaje	make up
los materiales	materials
mientras	while
el nombre	name
la palabra	word
el pasillo	corridor
el pendiente	earring
ponerse en contacto	to get in touch
prohibido	prohibited, banned
la puntualidad	punctuality
la regla	rule
el respeto	respect
sufrir	to suffer
traer	to bring
el trayecto	journey
el uniforme	uniform

10.1G El día en el instituto

acabar de	to have just done something
actuar	to perform
el aire libre	the open air
aislado/a	isolated
el/la alumno/a	pupil
aprender	to learn
la asignatura	subject
el bachillerato	A-level equivalent
el bocadillo	sandwich
bonito	lovely
campo de deportes	sports field
la clase	class
el/la compañero/a	classmate
corto/a	short
durar	to last
empezar	to start, to begin
el equipo	team, equipment
el estante	shelf
la evaluación	assessment
funcionar	to work, to function
ganar	to win
ir al baño	to go to the bathroom
el juego de mesa	board game
la hora de comer	lunch hour
el laboratorio	laboratory
la obra de teatro	play
la opción	option
la oportunidad	opportunity
pasar la lista	to take the register
el producto químico	chemical

Key Verbs

Acabar de To have just finished	Mejorar To improve	Maquillarse To put makeup on oneself	Hacer – to do/make	Ofrecer To offer
Acabo de I have just finished	Mejoro I improve	Me maquillo I put make up on	Hago I do	Ofrezco I offer
Acabas de You have just finished	Mejoras You improve	Te maquillas You put make up on	Haces You do	Ofreces You offer
Acaba de He/she it has just finished	Mejora He/she/ it improves	Se maquila He/she/it puts make up on	Hace s/he does	Ofrece He/she/it offers
Acabamos de We have just finished	Mejoramos We improve	Nos maquillamos We put make up on	Hacemos We do	Ofrecemos We offer
Acaban de They have just finished	Mejoran They improve	Se maquilan They put make up on	Hacen They do	Ofrecen They offer

10.1H Lo bueno y lo malo del instituto

el acoso	bullying
aguantar	to put up with
aislado/a	isolated
alegrar	to brighten up, to cheer up
aprobar	to pass an exam
el aspecto	appearance
la calefacción	heating
el castigo	punishment
el comportamiento	behaviour
la conducta	behaviour
corregir	to mark, to correct
cumplir con	to fulfil
en cuanto a	as regards
encenderse	to be turned on
enfadado/a	angry
enseñar	to teach, show
el equipo	equipment
la espalda	back
el estante	shelf
la explicación	explanation

10.1H Lo Bueno y lo malo del instituto

travieso/a	naughty, badly behaved
el trimestre	term
ya que	since, as
el fracaso	failure
golpear	to hit
hace falta	it is necessary
incómodo/a	uncomfortable
la intimidación	bullying
la pizarra	digital smartboard
mejorar	to improve
molestar	to disturb, to annoy
el ocio	leisure
la pared	wall
recordar	to remember
el repaso	revision
sucio/a	dirty
tardar	to take time, to delay



What we are learning this term:

- A. Giving your opinion about different subjects
- B. Talking about your studies
- C. Talking about your school life and daily routine
- D. Talking about school rules and uniform
- E. Translating into English

6 Key Words for this term

- | | |
|----------------|-----------------|
| 1. asignaturas | 4. suspender |
| 2. notas | 5. licenciatura |
| 3. aprobar | 6. elegir |

9.1G El instituto y las asignaturas

el arte dramático drama
 la asignatura subject
 la carrera career, university course
 las ciencias science
 la clase class
 la cocina cooking, food technology
 continuar to continue, carry on
 los deberes homework
 dejar to drop
 el dibujo art
 difícil difficult, hard
 divertido/a fun
 la educación física PE
 Escoger to choose
 el español Spanish
 estudiar to study
 fácil easy
 el francés French
 la geografía geography
 la historia history
 el inglés English
 las matemáticas maths
 práctico/a practical
 próximo/a next
 la selección choice
 Útil useful

9.1F ¿Cómo ser buen estudiante?

abrir to open
 Afectar to affect
 el apoyo support
 aprender to learn
 los apuntes notes
 asistir a to attend
 la biblioteca library
 el/la compañero/a classmate
 completar to complete
 Consultar to consult
 el debate discussion
 los deberes homework
 el diccionario dictionary
 la duda doubt, query
 el ejercicio exercise
 entender to understand
 la escuela school
 Esperar to hope, to wait, to expect
 el examen, exámenes exam, exams
 la excursión trip
 faltar a clase to miss lessons
 la frase sentence
 Intentar to try
 interrumpir to interrupt
 el instituto school
 levantar la mano to raise your hand
 la literatura literature
 llevar to take, to carry, to wear
 mejorar to improve
 mirar to look at
 el mundo world
 necesitar to need
 la nota grade
 ofrecer to offer
 el ordenador computer
 organizar to organise
 la palabra word
 la pantalla screen
 participar to take part
 pedir to ask for, to request
 pegado/a a glued to
 perder to lose, miss
 la pizarra blackboard
 la pizarra interactiva smartboard
 Preguntar to ask
 el/la profesor(a) teacher
 el progreso progress
 la prueba test
 Repasar to revise

Key Verbs

Aprobar To pass	Elegir To choose	Suspender To fail	Estudiar To study	Pensar To think
Apruebo I pass	Eligo I choose	Suspendo I fail	Estudio I study	Pienso I think
Apruebas You pass	Eliges You choose	Suspendes You fail	Estudias You study	Piensas You think
Aprueba He/she/it passes	Elige He/she/it chooses	Suspende He/she/it fails	Estudia He/she/it studies	Piensa He/she/it thinks
Aprobamos We pass	Elegimos We choose	Suspendemos We fail	Estudiamos We study	Pensamos We think
Aprueban They pass	Eligen They choose	Suspenden They fail	Estudian They study	Piensan They think

9.1F ¿Cómo ser buen estudiante?

el repaso revision
 responsable responsible
 resultar en to end up with, to lead to
 saber to know
 sacar buenas / to get good / bad grades
 malas notas
 serio/a serious
 las tareas homework
 el trabajo work, piece of work
 la tutoría tutorial
 Usar to use
 el vocabulario vocabulary

9.1H ¿Qué tal el instituto?

preocupar to worry
 la sala de informática IT room
 sencillo/a simple
 Sentirse to feel
 usar to use
 el viaje journey
 la zona área

9.1H ¿Qué tal el instituto?

el/la alumno/a pupil
 antiguo/a old
 asustado/a frightened
 asustar to frighten
 el atasco traffic jam, blockage
 atento/a attentive
 el aula (fem.) classroom
 ayudar to help
 buscar to look for
 cambiar to change
 cansado/a tired
 conocer to meet, to get to know
 contento/a glad, happy
 contestar to answer
 el curso school year, course
 los deberes homework
 deteriorado/a dilapidated, shabby
 distinto/a different
 la emoción excitement
 emocionante exciting
 encima on top
 encontrar to find
 explicar to explain
 feo/a ugly
 el gimnasio sports hall, gym
 hambriento/a hungry
 el idioma language
 inmenso/a immense
 el laboratorio laboratory
 largo/a long
 mejor better
 nervioso/a anxious, nervous
 el patio del recreo the school yard, playground
 la pregunta question

Translation Practice. G – blue F – orange H - Green	
Irene _____ porque estudió muy poco	Irene failed because she studied very little
No practicamos _____ atletismo.	We don't practise much athletics.
Cuando _____ de clase hay mucha gente	When we change class there are too many people
No _____ bastantes ordenadores	We don't have enough computers
El instituto está _____ lejos	The school is too far away
Hay _____ posibilidades de estudiarlo	There are few possibilities to study it
Hay _____ llevar uniform	You have to wear a uniform
No _____ usar el móvil	We cannot use mobile phones
No _____ fumar	You must not smoke
Me gustaría _____ para ir al colegio	I would like to put makeup on to go to school
Soy educado y _____	I am polite and considerate
Odio _____ los deberes en casa	I hate doing homework at home
Hay muchas _____ entre los dos	There are many differences between the two
Las aulas _____ ser más grandes	The classrooms ought to be bigger
Debería _____ más ordenadores	There ought to be more computers
Deberían _____ una piscina	They ought to build a swimming pool
He _____ mis estudios	I have finished my studies
Han _____ a casa	They have returned home

Key Questions: Answer the following in your own words. Use these model answers	
¿Qué crees que es lo peor / lo mejor aspecto del instituto?	El mejor aspecto del colegio es ... porque ... El peor aspecto del colegio es ... porque ...
¿Qué cambiarías de tu colegio si tuvieras la oportunidad?	Si tuviera la oportunidad, cambiaría/me gustaría cambiar las reglas. Me gustaría cambiar el uniforme porque me parece que es tan feo, me gustaría cambiar las reglas porque son demasiadas estrictas, me gustaría cambiar unos profesores porque son tan antipáticos
En tu opinión, ¿cuáles son las características más importantes de un buen profesor?	En mi opinión, un buen profesor es siempre simpático, nunca malhumorado, es de vez en cuando gracioso, es comprensivo y cariñoso, es siempre alegre y no es nunca antipático
¿Cómo es tu colegio, las reglas, los edificios, las instalaciones?	Mi colegio es un colegio grande que tiene circa ochocientos alumnos. Está en las afueras de Swindon en los barrios de Pinehurst y Penhill. Tenemos una biblioteca nueva, una cantina acogedora, un patio grande ... En el colegio no debes comer chicle, no debes acosar, no tienes que gritar, no deberías comportarse mal... En el colegio tienes que comportarse bien, llevar el uniforme, ir al baño solo durante el recreo, llegar al colegio a hora

Key Grammar	
Forming the preterite (past tense). Always remove the –AR, -ER, -IR endings first	Remember the preterite (past) tense endings for –AR, -ER, -IR verbs. They are: -AR: -é, -aste, -ó, -amos, -astéis, -aron -ER: -í, -íste, -ió, -imos, -istéis, -ieron -IR : -í, -íste, -ió, -imos, -istéis, -ieron
Forming the conditional ('would like to' tense). Always remove the –AR, -ER, -IR endings first	Remember the conditional ('would') tense endings for –AR, -ER, -IR verbs. They are: -AR, -ER, -IR: -ía, -ías, -ía, -íamos, -íais, -ían
Using the immediate future tense IR + A + INFINITIVE	Voy a casarme = I'm going to get married Va a discutir con su padre = He / She is going to argue with his/her father
Perfect Tense ('have done...') Formed with the verb 'haber':	Formed with the verb 'haber': he, has, ha, hemos, habéis, han + past participle: -ar: -ado -er/ir: -ido e.g. <i>He estudiado = I have studied</i>

Functions / Procedures / Subroutines

```
#defining the function
def greeting_function():
    name = input("Please enter your name: ")
    print(name+",", "I like it.")

#calling the function
greeting_function()

Please enter your name: Mr.Weston
Mr.Weston, I like it.
>>> |
```

String Manipulation

Using .upper() .lower() methods.

```
userName = input("Enter lowercase name: ")
userName = userName.upper()
print(userName) | Enter lowercase name: mr.weston
MR.WESTON
```

Concatenation (merging strings together).

```
firstName = input("Enter first name")
lastName = input("Enter last name")
fullName = firstName + lastName
print(fullName) | Enter first nameSamuel
Enter last nameWeston
SamuelWeston
```

```
userSentence = input("Enter a sentence")
sentenceList = userSentence.split()
print(sentenceList) | Enter a sentenceSphinx of black quartz, judge my vow
['Sphinx', 'of', 'black', 'quartz,', 'judge', 'my', 'vow']
```

Using .split() to put each word into a list.

Using .replace("wordToReplace", "wordReplacing") to replace individual words in a string.

```
userSentence = input("Enter a sentence for judgement")
judgedSentence = userSentence.replace("here", "leaving")
print(judgedSentence)
```

```
Enter a sentence for judgementI am here
I am leaving
```

Text Files

```
#setting the file which needs to be opened
fileName = "greeting.txt"
#instructing the program to open the file in "r" reading mode.
fileOpen = open(fileName, "r")
#reading and then printing the file
fileRead = fileOpen.read()
print(fileRead) | Hello there!
Good morning!
Hi everyone!
```

```
#opening the file in "a" append mode.
fileOpen = open(fileName, "a")
#adding a greeting at the end, on a new line "\n"
fileOpen.write("\nGreetings!")
#closing the file when we are done with it
fileOpen.close()
```

greeting - Notepad

File Edit Format View Help

```
Hello there!
Good morning!
Hi everyone!
Greetings!
```

```
#If the file doesn't exist, you can make it using open()
newFile = open("Newfile.txt", "w")
#writing to the new file and then closing it to save changes
newFile.write("Life as a file is great!")
newFile.close()
```

Newfile - Notepad

File Edit Format View Help

```
Life as a file is great!
```

Validation

```
userPassword = str(input("Enter password: "))
passwordLength = len(userPassword)
```

```
if passwordLength < 8:
    print("Password too short")
elif passwordLength >= 8:
    print("Password accepted")
```

```
Enter password: pencil
Password too short
>>>
= RESTART: C:/Users/samu
tion.py
Enter password: pencils!
Password accepted
```

```
try:
    #put all your program code here (indented) in order to catch any errors when they arise
    prin("Everything is fine")
```

```
#the catch to print an error message and end the program gracefully
except:
    print("An unhandled exception occurred.")
```

```
An unhandled exception occurred.
```

```
>>> |
```

Number Bases

Three common bases in computer science.

Decimal / Denary – Base 10, Our normal number system.

Binary – Base 2, used by Computers.

Hexadecimal – Base 16, easier for humans to understand and work with than binary and relates more to binary than denary does.

DECIMAL	HEX	BINARY
0	0	0000
1	1	0001
2	2	0010
3	3	0011
4	4	0100
5	5	0101
6	6	0110
7	7	0111
8	8	1000
9	9	1001
10	A	1010
11	B	1011
12	C	1100
13	D	1101
14	E	1110
15	F	1111

Uses for hexadecimal: Memory locations, error codes, colour codes, MAC addresses.

Units of Memory

Bits – Binary digits. Either 1 or 0.

Nibble – Four bits.

Byte – Eight bits.

1,000 bytes (1,000 B)	1 kilobyte (KB)
1,000 kilobytes (1,000 KB)	1 megabyte (MB)
1,000 megabytes (1,000 MB)	1 gigabyte (GB)
1,000 gigabytes (1,000 GB)	1 terabyte (TB)
1,000 terabytes (1,000 TB)	1 petabyte (PB)

Character Sets

Assigning a binary pattern to characters. There are two primary character sets.

ASCII -American Standard Code for Information Interchange. Uses seven bits for characters, which means it can hold at maximum 128 characters

Unicode - Uses sixteen bits as standard, allowing for just over 65,000 characters. Used for different languages, scientific symbols, emojis etc.

Terms

Term	Definition
Overflow Error	An overflow error occurs when the result of a calculation requires more bits than are in the available range.
Bit Depth / Sample Resolution	The number of bits we assign or are used for each sample
Colour Depth	The number of bits we assign for each pixel in an image. More bits means more colours available.
Pixel	Smallest part of a bitmapped image.
Bitmap Image	An image made up of a grid of pixels.
Resolution	The fineness of detail that the image contains, the higher the resolution, the more detail it contains and the higher the quality.
Compression	Compression reduces the file size by the reducing the number of bits inside the file. This makes transferring a file quicker and it takes up less storage.
Lossy Compression	Reduces digital file size by removing data.
Lossless Compression	Reduces digital file size without losing detail.

Run-Length-Encoding

Lossless compression where the data within the file is checked and when there is a consecutive series of the same data, they are stored as one entry instead of many. E.g. for the data below - 6 0 , 8 1, 6 0



Huffman Coding

A form of lossless compression which makes files smaller using the frequency with which characters appear in a message. This works particularly well when characters appear multiple times in a string as these can then be represented using fewer bits.

17. Business Aims & Objectives

Businesspeople like to use the term SMART objectives

Which Objective?	Explanation of Objective
Specific	Businesses set very specific targets that are very clear and to the point
Measurable	Businesses set measurable targets that can be measured. For example: Business set themselves specific sales targets over a set period.
Achievable	Businesses set realistic targets that are ambitious yet achievable.
Realistic	Businesses set realistic targets that will motivate employees at the same time they will be achievable
Time- Bound	Businesses set their targets over a period of time as this creates a sense of excitement and urgency.

18. Aims and Objectives in Business

Businesses have both financial and non-financial aims

Type of Objectives	Explanation
Financial Objectives	Profit. Sales. Market Share. Reduce costs.
Non-Financial Objectives	Social objectives. Independence. Control.

19. Business Revenue, Costs & Profits

Term	Definition
Fixed Costs	Costs that don't vary just because output varies for example 'rent'.
Profit (gross/net)	The difference between revenue and total costs; if the figure is negative the business is making a loss
Revenue	The total value of the sales made within a set period, such as a month.
Total Costs	All the costs for a set period, such as a month
Variable Costs	Costs that vary as output varies such as raw materials

20. Business Revenue, Costs & Profits

Term	Formulae
Sales Revenue	Price x Quantity Sold
Total Costs	Variable costs + Fixed Costs
(Gross) Profit	Total Revenue – Total Costs

21. Breaking Even

Term	Definition
Break - Even	The level of sales at which total costs are equal to total revenue. At this point the business is making neither a profit nor a loss.
Break-even Chart	A graph showing a company's revenue and total costs at all possible levels of output
Margin of Safety	The amount by which demand can fall before the business starts making losses

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Which Objective?

Specific

Measurable

Achievable

Realistic

Time- Bound

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Term

Definition

Fixed Costs

**Profit
(gross/net)**

Revenue

Total Costs

Variable Costs

20. Business Revenue, Costs & Profits

Term

Formulae

Sales Revenue

Total Costs

(Gross) Profit

18. Aims and Objectives in Business

Businesses have both financial and non-financial aims

Type of Objectives

Explanation

**Financial
Objectives**

**Non-Financial
Objectives**

21. Breaking Even

Term

Definition

Break - Even

Break-even Chart

Margin of Safety

22. The Importance of Cash

Question	Answer
Why does Cash matter to a Business?	Cash matters because, without it, bills go unpaid and a business can fail. If you have no cash, you can't pay suppliers or employees.
Why is cash important to a business?	Cash is required to pay suppliers, employees or other costs. Typical overheads include: Salaries/ Rent and Rates/ Utilities and Bills
What is the difference between cash and profit?	Cash flow shows the immediate impact of a transaction on a company's bank account; profit shows the longer-term impact after costs have been taken into account.

23. The Importance of Cash (definitions)

Term	Definition
Cash	The money the firm holds in notes and coins, and in its bank accounts
Cash Flows	The movement of money into and out of the firm's bank account.
Insolvency	When a business lacks the ability to pay its debts
Overdraft	A short-term form of credit. A bank will allow a business to spend more money than it actually has.
Overdraft Facility	An agreed maximum level of overdraft

25. Short Term Sources of Finance

Term	Definition
Bank Overdraft	If a company requires some short term finance they can negotiate to extend their overdraft facility with the bank
Trade Credit	When a supplier provides goods without immediate payment – This gives the business time to sell products in order to pay off the debt.

24. Cash Flow Forecasts

Cash flow forecasting means predicting the future flows of cash into and out of a Business.

Successful cash flow forecasts require:

- Accurate prediction of monthly sales
- Accurate predictions of when customers will pay for the goods they have bought
- Careful allowance of operating costs and the timing of payments
- Careful allowance for in flows and outflows of cash

Key Term	Definition
Opening Balance	The amount of cash in the bank at the start of the month
Net Cash Flow	Cash inflow minus cash outflow over the course of a month
Negative Cash Flow	When cash outflows are greater than cash inflows
Closing Balance	The amount of cash left in the bank at the end of the month

26. Long Term Sources of Finance

Term	Definition
Crowdfunding	Raising Capital online from many small investors (but not through the stock market).
Share Capital	Raising finance by selling a share of the business, Shareholders have the right to question the directors and take profit out the firm.
Venture Capital	A combination of share capital and loan capital, provided by an investor.
Retained Profit	Profit kept within the Business that is used for business growth.

22. The Importance of Cash

Question	Answer
Why does Cash matter to a Business?	
Why is cash important to a business?	
What is the difference between cash and profit?	

23. The Importance of Cash (definitions)

Term	Definition
Cash	
Cash Flows	
Insolvency	
Overdraft	
Overdraft Facility	

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Key Term	Definition
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26. Long Term Sources of Finance

Term	Definition
Crowdfunding	
Share Capital	
Venture Capital	
Retained Profit	

Food science

Functions of ingredients

Ingredients provide a variety of functions in recipes.

Carbohydrate, protein and fat

Carbohydrate, protein and fat all have a range of properties that make them useful in a variety of food products.

Carbohydrates perform different functions in food.

They can:

- help to cause the colour change of bread, toast and bakery products (dextrinisation);
- contribute to the chewiness, colour and sweet flavour of caramel;
- thicken products such as sauces and custards (gelatinisation).

Maillard reaction

Foods which are baked, grilled or roasted undergo colour, odour and flavour changes. This is primarily due to a group of reactions involving amino acids (from protein) and reducing sugars.

Dextrinisation

When foods containing starch are heated they can also produce brown compounds due to dextrinisation. Dextrinisation occurs when the heat breaks the large starch polysaccharides into smaller molecules known as dextrins which produce a brown colour.

Caramelisation

When sucrose (table sugar) is heated above its melting point it undergoes physical and chemical changes to produce caramel.

Gelatinisation

When starch is mixed with water and heated, the starch granules swell and eventually rupture, absorbing liquid, which thickens the mixture. On cooling, if enough starch is used, a gel forms.

Proteins perform different functions in food products.

They:

- aerate foods, e.g. whisking egg whites;
- thicken sauces, e.g. egg custard;
- bind ingredients together, e.g. fishcakes;
- form structures, e.g. gluten formation in bread;
- gel, e.g. lime jelly.

Gluten formation

Two proteins, gliadin and glutenin, found in wheat flour, form gluten when mixed with water. Gluten is strong, elastic and forms a 3D network in dough. In the production of bread, kneading helps untangle the gluten strands and align them. Gluten helps give structure to the bread and keeps in the gases that expand during cooking.

Gelation

Gelatin is a protein which is extracted from collagen, present in animal connective tissue. When it is mixed with warm water, the gelatin protein molecules start to unwind. On cooling, a stable, solid network is formed, trapping the liquid.

Denaturation

Denaturation is the change in structure of protein molecules. The process results in the unfolding of the protein's structure. Factors which contribute to denaturation are heat, salts, pH and mechanical action.

Coagulation

Coagulation follows denaturation. For example, when egg white is cooked it changes colour and becomes firmer (sets). The heat causes egg proteins to unfold from their coiled state and form a solid, stable network.

Aeration

Products such as creamed cakes need air incorporated into the mixture in order to give a well-risen texture. This is achieved by creaming a fat, such as butter or baking spread, with sugar. Small bubbles of air are incorporated and form a stable foam.

Fats performs different functions in food.

They help to:

- add 'shortness' or 'flakiness' to foods, e.g. shortbread, pastry;
- provide a range of textures and cooking mediums;
- glaze foods, e.g. butter on carrots;
- aerate mixtures, e.g. a creamed cake mix;
- add a range of flavours.

Plasticity

Fats do not melt at fixed temperatures, but over a range. This property is called plasticity.

Colloidal systems

Colloidal systems give structure, texture and mouthfeel to many different products.

System	Disperse phase	Continuous phase	Food
Sol	Solid	Liquid	Unset jelly
Gel	Liquid	Solid	Jelly
Emulsion	Liquid	Liquid	Mayonnaise
Solid emulsion	Liquid	Solid	Butter
Foam	Gas	Liquid	Whipped cream
Solid foam	Gas	Solid	Meringue

Raising agents

Raising agents include anything that causes rising within foods, and are usually used in baked goods. Raising agents can be:

- biological, e.g. yeast;
- chemical, e.g. baking powder;
- mechanical, e.g. adding air through beating or folding.

Functional ingredients

These are ingredients that are specifically included in food for additional health benefits. They include:

- probiotics – 'good' bacteria that may have a positive impact on human health;
- prebiotics – food ingredients that promote the growth of beneficial microorganisms in the gut;
- sterols/stanols – compounds that can lower cholesterol;
- healthy fats (e.g. omega-3);
- added vitamins and minerals (more than in the original food).

Food is prepared and cooked to:

- make the food more palatable – improves flavour, texture and appearance;
- reduce the bulk of the food;
- provide variety and interest to meals.

Methods of cooking food

The methods of cooking are divided up into groups. These are based on the cooking medium used. They are:

- moist/liquid methods, e.g. boiling;
- dry methods, e.g. grilling;
- fat-based, e.g. frying.

Selecting the most appropriate way of preparing and cooking certain foods is important to maintain or enhance their nutritional value.

- Vitamins can be lost due to oxidation during preparation or leaching into the cooking liquid.
- Fat-based methods of cooking increase the energy (calories) of the food.
- The use of different cooking methods affects the sensory qualities of the food.

There are three ways that heat is transferred to food.

- Conduction – the exchange of heat by direct contact with foods on a surface.
- Radiation – energy in the form of rays.
- Convection – currents of hot air or hot liquid transfer the heat energy to the food.

Key terms

Conduction: the exchange of heat by direct contact with foods on a surface.

Convection: currents of hot air or hot liquid transfer the heat energy to the food.

Functional ingredients: Included in food for additional health benefits.

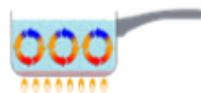
Heat transfer: transference of heat energy between objects.

Radiation: energy in the form of rays.

Tenderisation

• Mechanical tenderisation – a meat cleaver or meat hammer may be used to beat the meat. Cutting into small cubes or mincing can also help.

• Chemical tenderisation (marinating) – the addition of any liquid to flavour or soften meat before cooking.



Tasks

- Choose a recipe that you enjoy or have made recently and explain in detail the functions of the ingredients.
- Explain the function of raising agents, giving examples of recipes.

KS4 FOOD AND NUTRITION KNOWLEDGE ORGANISER T3

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-

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Key terms

Conduction:

Convection:

Functional ingredients:

Heat transfer:

Radiation:

Food is prepared and cooked to:

-
-
-

Tenderisation

- Mechanical tenderising
- Chemical tenderisation (marinating)



Year 10 PRODUCT DESIGN Term 3



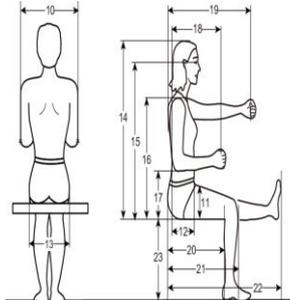
What we are learning this term:

- A. Scales of Production C. Impact on Enterprise E. Impact on People G. Ergonomics
 B. Production Methods D. Anthropometric Data F. Impact on Design

A. Scales of Production		
Type	How Many?	Examples
One-off Production 	1	<ul style="list-style-type: none"> Towers /bridges Bespoke house Custom made clothes
Batch Production 	10s-1000s	<ul style="list-style-type: none"> Baked Foods Limited Edition Socks Chairs
Mass Production 	10,000s – 100,000s	<ul style="list-style-type: none"> Cars Bottles Microchips Plain shirts
Continuous Production 	100,00s+	<ul style="list-style-type: none"> Energy Water Paper Plastic

B. Production Methods	
	Flexible Manufacturing Systems (FMS)
This is where automated machines are adaptable and can produce different products if needed.	
	Lean Manufacturing
This is where waste and energy is kept to a minimum. This saves money and resources in production, as well as helping minimise the environmental impact of producing products.	
	Just-in-Time (JIT) Manufacturing
This is where manufacturers only order materials, parts, etc, when needed. This can be used in any scale of production but its particularly useful for one-off production.	

C. Impact on Enterprise	
Crowdfunding 	A way of raising money from large numbers of people to launch a new product through websites.
Virtual marketing and retail 	Promotion of products online and sharing experiences, reviews and recommendations.
Cooperatives 	A business that is owned and managed by it's workers, all working towards a common goal.
Fair trade 	An organisation that helps workers have fair trading and working conditions in developing countries

D. Anthropometric Data	
The study of human measurements to ensure the products and environments are the correct size for the intended user.	
	

E. Impact on People		
Technology Push 	When technological discoveries are used to drive the development or creation of a product	
Market Pull 	When products are developed or created to meet the needs of society or a gap in the market.	
Universal Design 	When designs are focused on serving the broadest range of users possible, rather than trying to address individual accessibility or inclusion objectives.	
Inclusive Design 	When the designer focuses on exploring ways of serving a full spectrum of people, regardless of age, gender, and disability.	
User Centred Design (USD) 	When designers focus on the end-user's wants and needs in each phase of the design process.	

F. Impact on Design	
Planned obsolescence	Designing products that will have a limited life and that will become obsolete and require to be replaced, such as disposable razors.
Design for Maintenance	Designing products that are more durable and have spare parts available to mend and maintain them, such as a push bike.
Design for Disassembly	When a product has reached the end of its life it can be taken apart and parts reused or recycled, such as a school seat.
Environmental Design	Designing products to be more sustainable and improving the overall environmental impact of a product, such as paper straws.

G. Ergonomics	
This is the consideration that leads to a product being designed in a way that makes it easy to use. Such as a person sitting at their computer desk or the type of water bottle they use.	



Year 10 PRODUCT DESIGN Term 3



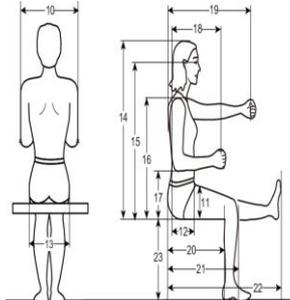
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- F. Impact on Design
- G. Ergonomics

A. Scales of Production 		
Type	How Many?	Examples
One-off Production 		
Batch Production 		
Mass Production 		
Continuous Production 		

B. Production Methods 	
	Flexible Manufacturing Systems (FMS)
	Lean Manufacturing
	Just-in-Time (JIT) Manufacturing

C. Impact on Enterprise 	
Crowdfunding 	
Virtual marketing and retail 	
Cooperatives 	
Fair trade 	

D. Anthropometric Data 	
	

E. Impact on People 	
Technology Push 	
Market Pull 	
Universal Design 	
Inclusive Design 	
User Centred Design (USD) 	

F. Impact on Design 	
Planned obsolescence	
Design for Maintenance	
Design for Disassembly	
Environmental Design	

G. Ergonomics 	



What we are learning this term:

- A. One-Point Perspective
- B. Two-point Perspective
- C. Isometric Drawing
- D. Exploded Drawing
- E. Oblique Drawing
- F. CAD
- G. Orthographic Drawing

Design Strategies Introduction.

Design strategies are used to create technical drawings, to show an object in 3D on a 2D page. Perspective drawings show an object getting smaller in the distance. The rest are done to scale.

A. One-point Perspective Drawing

C. Isometric Technical Drawing

E. Oblique Technical Drawing

F. CAD (Computer Aided Design)

B. Two-point Perspective Drawing

D. Exploded Technical Drawing

G. Orthographic Projection – 2D NOT 3D Drawing Strategy!

- Object Line
- - - Hidden Line
- · - · - Center Line
- Dimension Line
- Construction Line



What we are learning this term:	
A.	Understanding professional works
B.	What is a professional work
C.	What is a practitioner
D.	How do we analyse a performance
E.	What are physical skills
F.	What are interpretive skills
G.	Three different performance styles / genres

6 Key Words for this term	
1 Practitioners	4 Performance material
2 Physical skills	5 Analyse
3 Interpretive skill	6 Intentions

A.	Key question – What is the artistic purpose of a performance work?
<p>When watching a professional performance, the key questions you need to think about are the following...</p> <p>How do we Explore artistic purpose?</p> <p>Explore artistic purpose (across all three disciplines/styles) including:</p> <ul style="list-style-type: none"> to educate to inform to entertain to provoke to challenge viewpoints to raise awareness to celebrate. 	

A.	Component 1 – Key focus
<p>In this component of the qualification students will develop their understanding of drama by examining the work of existing practitioners and the processes used to create performance. Students should experience a range of work across the discipline of drama by viewing recorded and/or live work.</p> <p>While this is primarily a theoretical study of the performing arts practical investigations, students will be working at developing practical skills through workshops and links with Component 2 Developing Skills and Techniques in the Performing Arts, to engage in primary exploration of specific repertoire.</p>	

C.	Key question from Assessment objectives
<ol style="list-style-type: none"> 1. What are physical skills 2. What are interpretive skills 3. How do we use these skills practically? 4. How do we IMPROVE on these skills? 	<ol style="list-style-type: none"> 1. What is a professional work 2. What is a practitioner 3. How do we analyse a performance 4. What are a practitioners creative intentions

G.	Key learning aims from Component 1
<p><i>Learning aim A: Examine professional practitioners' performance work</i></p>	<p>A1: Professional practitioners' performance material, influences, creative outcomes and purpose</p> <p>Examine live and recorded performances in order to develop understanding of practitioners' work with reference to influences, outcomes and purpose.</p> <p>Focus on thematic interpretation of particular issues and how artists communicate their ideas to an audience.</p> <p>Roles and responsibilities in theatre.</p>
	<p><i>Learning aim B: Explore the interrelationships between constituent features of existing performance material</i></p> <p>Processes used in performance</p> <ul style="list-style-type: none"> ● Responding to stimuli to generate ideas for performance material. ● Exploring and developing ideas to develop material. ● Discussion with performers. ● Setting tasks for performers. ● Sharing ideas and intentions. ● Providing notes and/or feedback on improvements.

E.	Keywords
Practitioners	A professional theatre maker who creates in a specific style led by a specific theatre ideology.
Performance material	The practical work that a practitioner creates for performance.
Creative Intentions	The ideas behind the choreography, why the choreographer choose to create the work.
Review	Look over your current work and the work of others and be able to review and comment on your own and others practice
Analyse/ Evaluate	Watch and then analyse your own performance and the work of others and giving comments and judgements on what you see
Influences	How the practitioner has been influenced by others, their experiences, their training and how this has affected the work they create.
Physical skills	The physical attributes that an actor uses, stamina, strength, flexibility, control, to dance with technical accuracy.



What we are learning this term:	
A.	Understanding professional works
B.	What is a professional work
C.	What is a practitioner
D.	How do we analyse a performance
E.	What are physical skills
F.	What are interpretive skills
G.	Three different performance styles / genres

6 Key Words for this term	
1 Practitioners	4 Performance material
2 Physical skills	5 Analyse
3 Interpretive skill	6 Intentions

A.	Key question – What is the artistic purpose of a performance work?
<p>When watching a professional performance, the key questions you need to think about are the following... How do _____? (across all three disciplines/styles) including: to _____ to _____ to _____ to _____ to _____ to _____</p>	

A.	Component 1 – Key focus
<p>In this component of the qualification students will develop their understanding of drama by examining the work of _____s and the _____ used to _____.</p> <p>Students should experience a range of work across the discipline of drama by viewing recorded and/or live work.</p> <p>While this is primarily a theoretical study of the performing arts practical investigations, students will be working at developing practical skills through _____s and links with Component 2 _____ and Te_____s in the Performing Arts, to engage in primary exploration of specific repertoire.</p>	

C.	Key question from Assessment objectives
<p>1. What are physical skills 2. What are interpretive skills 3. How do we use these skills practically? 4. How do we IMPROVE on these skills?</p>	<p>1. What is a professional work 2. What is a practitioner 3. How do we analyse a performance 4. What are a practitioners creative intentions</p>

G.	Key learning aims from Component 1
<p><i>Learning aim A: Examine professional practitioners' performance work</i></p>	<p>A1: Professional practitioners' performance material, influences, creative outcomes and purpose</p> <p>Examine _____ and _____ performances in order to develop _____ of practitioners' work with reference to _____s, o_____s and p_____se. Focus on _____ i_____ of particular i_____ and how artists c_____te their ideas to an _____e. Roles and responsibilities in theatre.</p>
	<p><i>Learning aim B: Explore the interrelationships between constituent features of existing performance material</i></p> <p>Processes used in performance</p> <ul style="list-style-type: none"> • Responding to _____ to generate id_____s for performance material. • Exploring and developing ideas to develop material. • D_____on with performers. • Setting _____ for performers. • S_____ng ideas and intentions. • Providing _____ and/or fe_____ck on imp_____nts.

E.	Keywords
Practitioners	
Performance material	
Creative Intentions	
Review	
Analyse/ Evaluate	
Influences	
Physical skills	



Main assessment objectives	
Learning outcome: Know the personal qualities, styles, roles and responsibilities associated with effective sports leadership.	
Be able to plan sports activity sessions.	

What we are learning this term:	
A. Different leadership roles	
B. Role-related responsibilities	
C. Personal qualities	
D. Leadership styles	
E. Key considerations when planning sports activity	

Can you give examples of managers from different sports?	
Gareth Southgate Eddie Jones	

Role models	
Positive Mo Farah Nicole Adams	Negative Luis Suarez Nick Kyrgios

A. The different leadership roles within sport	
Role	Definition
Coach	A person involved in the direction, instruction and training of the operations of a sports team
Manager	Responsible for handling the business matters of athletes and sports teams
Captain	The leader of the team who is usually also a player
Teacher	A person who teaches, especially in a school
Expedition leader	Someone who leads groups on adventurous activities
Role model	A person looked to by others as an example

A. Role related responsibilities	
Knowledge of activity Enthusiasm for activity Knowledge of safety Knowledge of child protection issues Knowledge of basic first aid	

G. Considerations when planning sports activities	
Session content	Objectives for the session appropriate venue Equipment needs Supervision needs Timing of activities Introduction/conclusion of session Basic warm up/cool down Skills and technique development Engaging Organisation
Safety	Risk assessments- facilities, equipment/clothing checks, activity-specific risks Corrective action- wiping up puddles, removing litter, reporting faulty equipment Emergency procedures- procedures in the event of an accident, procedures in the event of other emergencies, summoning qualified help, completion of relevant documents

Personal qualities	
Reliability Punctuality Confidence Communicator Creativity	

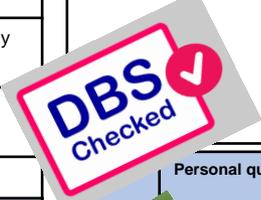
Key sections	
Different leadership roles and opportunities	

Captain Coach Expedition leader	Manager Teacher Role model
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Role related responsibilities	
Knowledge of; Activity Safety Child protection Basic first aid	Enthusiasm for activity

Personal qualities	
Reliability Punctuality Communication Confidence Creativity	

Leadership styles	
Autocratic Democratic Laissez-faire	





Main assessment objectives

Learning outcome: Know the personal qualities, styles, roles and responsibilities associated with effective sports leadership.
Be able to plan sports activity sessions.



What we are learning this term:

- A. Different leadership roles
- B. Role-related responsibilities
- C. Personal qualities
- D. Leadership styles
- E. Key considerations when planning sports activity

C.	Can you give examples of managers from different sports?
Role models	
Positive	Negative

A.	Role related responsibilities

G.	Considerations when planning sports activities
<i>Session content</i>	
<i>Safety</i>	

A.	Personal qualities

Key sections

Different leadership roles and opportunities

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Role related responsibilities

--	--

Personal qualities

--	--

Leadership styles

--	--

A.	The different leadership roles within sport
Role	Definition
Coach	
Manager	
Captain	
Teacher	
Expedition leader	
Role model	

A.	Leadership styles



What we are learning this term:

- A. Health & Safety C. Isometric E. Materials and properties
 B. Manufacturing processes D. Marking and measuring tools

A. Health & Safety

Risk Assessment
 A risk assessment is the analysis of the risks involved when using equipment or performing a process.

Signage
 Signage is the word used for all the signs that you may see in a workshop environment. Knowing how to translate and understand the signs in a workshop is vital when dealing with potentially dangerous equipment and processes.

Mandatory sign-
 Specific instruction on behaviour

Prohibition sign-
 Prohibiting or actions

Warning sign-
 Giving warning of hazard or danger

No danger sign-
 Information on exits, first aid etc

B. Manufacturing processes

Pillar drill

Pillar drills are free standing machine tools that use high powered motors to rotate drill bits at varying speed

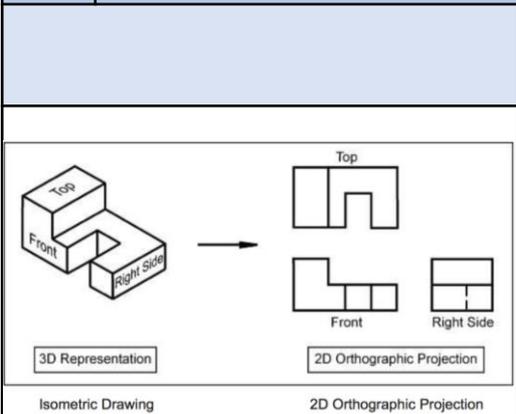
Milling machine

A milling machine is a device that rotates a circular cutting tool that has a number of cutting edges. The workpiece is held in a vice or similar device clamped to a table that can move in directions. X, Y & Z axis

Centre lathe

A centre lathe is used to manufacture cylindrical product /objects and is 'turned' to create different shapes. Different cutting tools can be used such as **facing, parting** and **knurling**.

C. Isometric



The symbol \varnothing on this dimension represents **Diameter** – so it is telling us how wide the circle is overall.

The letter R on this dimension tells us the **Radius** of the curve or circle – the distance from the centre to the outside

D. Marking and measuring tools

Inside calliper – Used by placing it inside the object to be measured and expanding the arms. Measures the inside of a hollow space.

Outside calliper – Used by closing the arms on to the outside of the object to be measured. Wide arms allow it to reach around protruding parts of the object.

Dividers - The ends of these legs are very sharp, so it can scratch into surfaces. Is used for measuring, transferring, or marking off distances onto materials.

Odd-leg or "jenny" calliper – One leg has a scratching tool while the other has a notch. This allows the user to hook the tool to the edge of a workpiece and slide it along to make marks equidistant from the edge.

Vernier Calliper – The most versatile calliper. Can measure depth, inside measurements, and outside measurements of objects. May also have a digital display.

E. Materials and properties

Strength Ability of a material to withstand compression, tension and shear

Hardness Ability to withstand impact without damage

Toughness Materials that are hard to break or snap are tough & can absorb shock

Malleability Being able to bend or shape easily would make a material easily malleable

Ductility Materials that can be stretched are ductile

Elasticity Ability to be stretched and then return to its original shape



What we are learning this term:

- A. Health & Safety
- B. Manufacturing processes
- C. Orthographic
- D. Tools & Equipment
- E. Materials and properties

A. Health & Safety

Risk Assessment	
Signage	

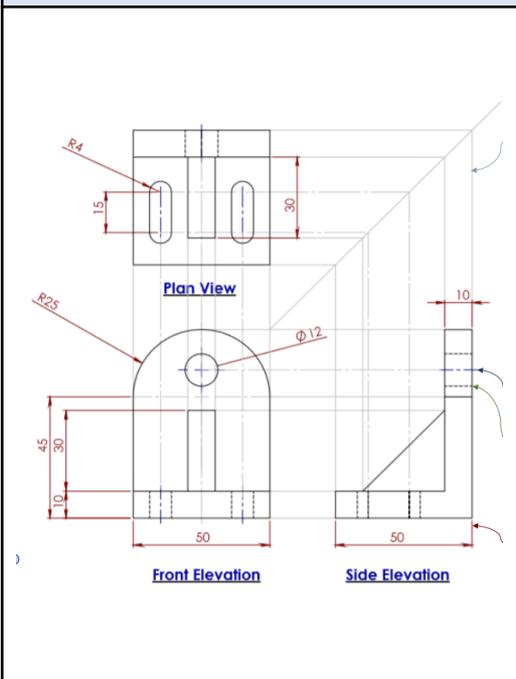
	_____ sign- Specific instruction on behaviour		_____ sign- Prohibiting or actions
	_____ sign- Giving warning of hazard or danger		_____ sign- Information on exits, first aid etc

B. Manufacturing processes

Pillar drill
Milling machine
Centre lathe

C. Orthographic

The study of human measurements to ensure the products and environments are the correct size for the intended user.



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D. Tools & Equipment

E. Materials and properties

Strength	
Hardness	
Toughness	
Malleability	
Ductility	
Elasticity	

What we are learning this term:	
A.	Key words
B.	What are the main life stages
C.	What are the 4 areas of growth and development (PIES)?
D.	How do Humans develop physically (P)?

A. Key words for this Unit	
Characteristics	Something that is typical of people at a particular life stage.
Life stages	Distinct phases of life that each person passes through.
Growth	Increased body size such as height, weight.
Development	Involves gaining new skills and abilities such as riding a bike.
Gross motor development (G)	Refers to the development of large muscles in the body e.g. Legs
Fine motor development (F)	Refers to the development of small muscles in the body e.g. Fingers
Language development	Think through and express ideas
Contentment	An emotional state when people feel happy in their environment, are cared for and well loved
Self-image	How individuals see themselves or how they think others see them
Self-esteem	How good or bad an individual feels about themselves and how much they value their abilities.
Informal relationships	Relationships formed between family members
Friendships	Relationships formed with people we meet in the home or in situations such as schools, work or clubs
Formal relationships	relationships formed with non-family/friends – such as teachers and doctors.
Intimate relationships	romantic relationships.

B	What are the main life stages?		C	What are the 4 areas of growth and development (PIES)?
Age Group	Life Stage	Developmental Characteristics and Progress	 Physical Development (P)  Intellectual Development (I)  Emotional Development (E)  Social Development (S)	P = growth patterns and changes in the mobility of the large and small muscles in the body that happen throughout life. I = how people develop their thinking skills, memory and language. E = how people develop their identity and cope with feelings. S = describes how people develop friendships and relationships.
0-2 years	Infancy	Sill dependent on parents but growing quickly and developing physical skills.		
3-8 years	Early Childhood	Becoming increasingly independent, improving thought processes and learning how to develop friendships.		
9-18 years	Adolescence	Experiencing puberty, which bring physical and emotional changes.		
19-45 years	Early Adulthood	Leaving home, making own choices about a career and may start a family.		
46-65 years	Middle Adulthood	Having more time to travel and take up hobbies as children may be leaving home; beginning of the aging process.		
65+ years	Later Adulthood	The aging process continues, which may affect memory and mobility.		

D.	How do humans develop physically (P)?
0-2	<ul style="list-style-type: none"> Gross Motor Development (G) = life head, roll over, sit unaided, walk holding onto something, walk unaided, climb stairs, kick and throw, walk upstairs, jump. Fine Motor Development (F) = hold a rattle for short time, reach for an item, pass item from one hand to other, hold between finger and thumb, scribble, build a tower, use a spoon, draw lines and circles, turn page of a book.
3-8	<ul style="list-style-type: none"> G = ride a tricycle, catch a ball with two hands, walk backwards and step to the side, bounce a ball, run on tiptoes, ride a bike, catch a ball with one hand, balance along a thin line. F = hold a crayon to make circles and lines, thread small beads, copy letters and shapes with a pencil, make detailed models with construction bricks, joined up writing, use a needle to sew.
9-18	<ul style="list-style-type: none"> Girls = puberty starts at 10-13 years, breasts grow, hips widen, menstruation begins, uterus and vagina grow. Boys = voice deepens, muscles and strength increase, erections, facial hair, produce sperm. Both = pubic and underarm hair, growth spurts.
19-45	<ul style="list-style-type: none"> Physically mature, sexual characteristics are fully formed, peak of physical fitness, full height, women at most fertile. Later in the life stage people may put on weight, hair turn grey and men may lose hair, women's menstrual cycle was slow down
46-65	<ul style="list-style-type: none"> People may put on weight, hair turn grey and men may lose hair, women's menstrual cycle was slow down. Women go through the menopause – when menstruation ends and they can no longer become pregnant. Men may continue to be fertile throughout life but decrease in sperm production in this life stage.
65+	<ul style="list-style-type: none"> Women's hair becomes thinner, men may lose most of their hair, skin loses elasticity and wrinkles appear, nails hard and brittle, bones weaken, higher risk of contracting infections disease and illness. Stamina, reaction time, muscle and senses (hearing, sight, taste) all reduce.

What we are learning this term:	
A. Key words	
B. What are the main life stages	
C. What are the 4 areas of growth and development (PIES)?	
D. How do Humans develop physically (P)?	
A.	Key words for this Unit
Characteristics	
Life stages	
Growth	
Development	
Gross motor development (G)	
Fine motor development (F)	
Language development	
Contentment	
Self-image	
Self-esteem	
Informal relationships	
Friendships	
Formal relationships	
Intimate relationships	

B	What are the main life stages?		C	What are the 4 areas of growth and development (PIES)? Explain them.
Age Group	Life Stage	Developmental Characteristics and Progress		
0-2 years			Physical Development (P) 	
3-8 years				
9-18 years			Intellectual Development (I) 	
19-45 years			Emotional Development (E) 	
46-65 years				
65+ years			Social Development (S) 	

D.	<u>How do humans develop physically (P)?</u>
0-2	
3-8	
9-18	
19-45	
46-65	
65+	

What we are learning this term:		F. How do humans develop emotionally (E)?		
E. How do humans develop intellectually (I)? F. How do humans develop emotionally (E)? G. How do humans develop socially (S)?				
E. How do humans develop intellectually (I)?				
Infancy 	At birth brains are already well developed. Infants use all of their senses to learn about the world around them. Infancy is a time of rapid intellectual development. At 3 months infants can remember routines. At 9-12 months infants are developing their memory. At 12 months to 2 years infants understand processes and how things work. Language begins to develop during this stage.	<u>Bonding and Attachment</u> Bonding and attachment describe the emotional ties an individual forms with others. It starts in the first year of life between infants and their main carer because that person fulfils the infants needs which makes them feel safe and secure.	<u>Self-image and Self-esteem</u> Self-image is heightened during adolescence because of the physical changes we experience. Our self-esteem can change from day to day based on a variety of factors including employment and health status.	
	Early childhood 	At 3-4 years of age children become more inquisitive and enjoy exploring objects and materials. They ask lots of questions and enjoy solving simple problems. At 5-6 years old children's memory is becoming well developed. This helps them to talk about the past and anticipate the future.	<u>Security</u> For infants and young children, security is mainly the feeling of being cared for, being safe and loved – it is closely linked with attachment.	<u>Security</u> Adolescence may feel insecure because of puberty. Adults may feel insecure about relationships, job security of income. Later in life adults may feel insecure about staying in their own home or going into a care home. Feeling secure helps us cope better with everyday situations.
		Adolescence 	During this time abstract thought is developed – thinking logically and solving complex problems are possible by the end of this life stage. Adolescents may find it difficult to understand the consequences of their actions but they are developing empathy – seeing things from another's point of view.	<u>Contentment</u> Infants and young children are content if they have had enough food, love, are clean and dry and all other needs are met.
Early and Middle Adulthood 	By these life stages most adults have a good range of general knowledge. They use this knowledge and experience to solve problems that they come across in their personal and work lives.	<u>Independence</u> Independence is to care for yourself and make your own decisions. Infants are completely dependent on their carer. As children enter early childhood they develop more independence – feed self and get dressed. However, children still need a lot of help from their carer.	<u>Independence</u> Adolescence are dependent on their parents but are beginning to enjoy more independence and freedom to make their own choices. Adults enjoy living independently and controlling their own lifestyle and environment. Later in adulthood people become more dependent on others again.	
Later adulthood 	During this life stage people continue to learn and develop intellectually, however, their speed of thinking and memory may decline. This may affect their ability to think through problems and make logical decisions.	G. How do humans develop socially (S)?		
		Life Stage	Types of relationships and social development	
		Infancy	<ul style="list-style-type: none"> • Solitary Play - From birth to 2 years, infants tend to play alone although they like to be close to their parent or carer; they may be aware of other children but not play with them. 	
		Early childhood	<ul style="list-style-type: none"> • Parallel Play - From 2 to 3 years, children enjoy playing next to other children but are absorbed in their own game; they are not socialising or playing with other children. • Cooperative or social play – from 3 years upwards, children start to play with other children; they have developed social skills that help them to share and talk together; they often make up games together, such as being a shopkeeper and customer. 	
		Adolescence	<ul style="list-style-type: none"> • People become more independent and build more informal and formal relationships. • Social development closely linked to emotions. • Often strongly influenced by peers – 'peer group pressure'. 	
		Early adulthood	<ul style="list-style-type: none"> • Increased independence means greater control of decisions about informal relationships. • People may be developing emotional and social ties with partners and their own children. • Social life often centred on the family but social skills are required to build and maintain formal relationships. 	
		Middle adulthood	<ul style="list-style-type: none"> • Children have often left home, but there are likely to still be strong family relationships. • Social circles may expand through travel, spending more time on hobbies or joining new groups. 	
		Later adulthood	<ul style="list-style-type: none"> • Retired by this stage and so may enjoy more social time with family and friends or join new groups. • However, later in the life stage people may begin to feel isolated if they struggle to get out or if partners and friends pass away. 	

What we are learning this term:		F. How do humans develop emotionally (E)? Explain each.	
E. How do humans develop intellectually (I)? F. How do humans develop emotionally (E)? G. How do humans develop socially (S)?		Infancy and Early Childhood	
E. <i>How do humans develop intellectually (I)?</i>		Adolescence and adulthood	
Infancy		Bonding and Attachment	
		Self-image and Self-esteem	
		Security	
		Contentment	
Early childhood		Independence	
			
		G. How do humans develop socially (S)?	
		Life Stage Types of relationships and social development	
Adolescence		Infancy	
		Early childhood	
		Adolescence	
Early and Middle Adulthood		Early adulthood	
		Middle adulthood	
Later adulthood		Later adulthood	
			

What we are learning this term:	
H.	Key words
I.	How do physical factors affect development?
J.	How does lifestyle affect development?
K.	How do social and cultural factors affect development?
L.	How do relationships and isolation affect development?
M.	How do economic factors affect development?

H	Key words:
Genetic inheritance	Genes the person inherits from their parents
Genetic disorders	Health conditions that are passed on from parent to child through their genes. e.g. cystic fibrosis
Lifestyle Choices	Include the food you eat and how much exercise you do. They also include whether you smoke, drink alcohol or take illegal drugs.
Appearance	The way that someone or something looks
Factor	A circumstance, fact, or influence that contributes to a result
Gender role	The role and responsibilities determined by a person's gender.
Culture	ideas, customs, and social behaviour.
Role models	Someone a person admires and strives to be like.
Social Isolation	Lack of contact with other people
Material possessions	Things that are owned by an individual
Economic	To do with person's wealth and income.

I.	How do physical factors affect development?	
	Genetic Disorders	Disease and Illness
Physical Development	A person's physical build can affect physical abilities. Inherited diseases may affect strength and stamina needed to take part in exercise.	May affect the rate of growth in infancy and childhood. Could affect the process of puberty. Could cause tiredness and/or mobility problems. Could limit of prevent participation in physical activity.
Intellectual Development	Some genetically inherited diseases may result in missed schooling, or have a direct impact on learning – conditions such as Edward's syndrome impact learning.	School, college, university, work or training could be missed. Memory and concentration could be affected.
Emotional Development	Physical appearance affects how individuals see themselves (self-image), and how others respond to them impacts on their confidence and wellbeing.	May cause worry and/or stress. Individuals may develop negative self-esteem. Could lead to feelings of isolation.
Social Development	Physical characteristics or disease may affect opportunities or confidence in building friendships and becoming independent.	May cause difficulty in having opportunities to socialize with other and build wider relationships.

J.	How does lifestyle affect development?	
Lifestyle choices include; diet, exercise, alcohol, smoking, sexual relationships and illegal drugs, appearance.		
Positive lifestyle choices lead to: <ul style="list-style-type: none"> • Healthy hair, skin, nails and teeth • Positive self-image • Energy and stamina • Good health • Emotional security 		Negative lifestyle choices lead to: <ul style="list-style-type: none"> • Being overweight or underweight • Lack of energy • Ill health • Negative self-image • Sexually transmitted diseases (STDs) • Unplanned pregnancy 
Our appearance includes: body shape, facial features, hair and nails, personal hygiene and our clothing. Our appearance can affect the way we view ourselves- self-image		
Positive self-image: <ul style="list-style-type: none"> • Feel good about yourself. • Healthy hair, skin, nails and teeth • Big social circle. • High self-esteem. • High self-confidence. 		Negative self-image <ul style="list-style-type: none"> • Low self-esteem • Low self-confidence • Can lead to eating disorders e.g. anorexia • Can lead to anxiety or depression • Can lead to self-harm • Negative impact on building relationships- social circle decreases. 

What we are learning this term:	
H.	Key words
I.	How do physical factors affect development?
J.	How does lifestyle affect development?
K.	How do social and cultural factors affect development?
L.	How do relationships and isolation affect development?
M.	How do economic factors affect development?

H	Key words:
Genetic inheritance	
Genetic disorders	
Lifestyle Choices	
Appearance	
Factor	
Gender role	
Culture	
Role models	
Social Isolation	
Material possessions	
Economic	

I.	How do physical factors affect development?	
	<u>Genetic Disorders</u>	<u>Disease and Illness</u>
Physical Development		
Intellectual Development		
Emotional Development		
Social Development		

J.	How does lifestyle affect development?	
Lifestyle choices include; diet, exercise, alcohol, smoking, sexual relationships and illegal drugs, appearance.		
<u>Positive lifestyle choices lead to:</u>		<u>Negative lifestyle choices lead to:</u>
<ul style="list-style-type: none"> • • • • • 		<ul style="list-style-type: none"> • • • • •
Our appearance includes: body shape, facial features, hair and nails, personal hygiene and our clothing. Our appearance can affect the way we view ourselves- self-image		
<u>Positive self-image:</u>		<u>Negative self-image</u>
<ul style="list-style-type: none"> • • • • • 		<ul style="list-style-type: none"> • • • • •



K How do social and cultural factors affect development

Development can be influenced by the persons **culture or religion** because it affected their:

- **Values:** how they behave
- **Lifestyle choices:** diet, appearance

<p><u>Positive affects of a persons culture/religion:</u></p> <ul style="list-style-type: none"> • A sense of security and belonging from sharing the same values and beliefs with others. • Good self-esteem through being accepted and valued by others 	<p><u>Negative affects of a persons culture/religion:</u></p> <ul style="list-style-type: none"> • Feeing discriminated against by people who do not share their religion/culture which leads to low self-image • Feeing excluded and isolated because their needs like diet, are not catered for.
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Community refers to: local area where people live, school, religious group or hobby clubs. They have common values and goals.

<p><u>Belonging to a community:</u></p> <ul style="list-style-type: none"> • Brings sense of belonging essential for emotional development. • Building and maintaining relationships- social development • Feeling of security. • Increases self-image and self-confidence 	<p><u>Not belonging to a community:</u></p> <ul style="list-style-type: none"> • Minimal contact with others- isolation • Anxiety leading to depression • Making negative lifestyle choices • Feeling less secure • Difficulty in building relationships • Slow self-image and self-confidence
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Traditionally, men and women had distinctive responsibilities and expectations which for their gender called **gender roles**. However, nowadays UK equality legislation stops people being discriminated against because of their gender.

What happens when people face discrimination because of gender:

- They might be excluded from a group
- They may be refused promotion at work
- They may be expected to carry out a particular role
- They may be paid less.

What we are learning this term:

K. How do social and cultural factors affect development?
 L. How do relationships and isolation affect development?
 M. How do economic factors affect development?

L	How do relationships and isolation affect development?
1	In adolescence, young people often argue with parents because they want more independence- negative affect on family relationships- can lead to isolation from them.
2	In later life, older people might need to rely on their children for support. This then has a positive affect on their development because all their need are catered for.
3	Relationships are important because they provide emotional security, contentment and positive self- esteem.
4	The breakdown of personal relationships can have a negative effect on persons PIES development: Low self-esteem, loss of confidence, stress.
5	Isolation can happen when individuals do not have the opportunity of regular contact with others. They have no one to share their feelings, thoughts and worries with resulting in feeling insecure and anxious.
6	Isolation can happen because they live alone, are unemployed or retired, are discriminated against or have an illness or a disability.
7	People have role models- infants learn by copying others, and adolescence base their identity on their role models. Role models can influence how people see themselves compared to others and their lifestyle chices0 can be positive or negative.

M	How do economic factors affect development	
	Having enough money gives individuals and their families feeling of content and security	Not having enough money causes stress and anxiety.
	Having enough money means that the whole family is eating healthy.	Not having enough money can mean that the family is not about to eat well balanced diet, and this has a negative effect on their physical development
	Elderly people rely on state pension to live which is not enough and have to cut down on travel, shopping, bills, therefore it speeds their aging process and lead to health decline.	
	<p><u>Living in good housing with open spaces:</u></p> <ul style="list-style-type: none"> • Feeling good about themselves • Be more likely to stay healthy, • Space to take exercise • Feel safe ad secure • Warmth 	<p><u>Living in a poor housing with cramped and damp conditions:</u></p> <ul style="list-style-type: none"> • Have low self-esteem and self-image • Be more likely to experience ill health • Be lessson likely to exercise • Anxious and stressed.
	Material possession like a new phone or coat has a positive effect on the persons development because they might have more friends as they look nicer, high self-image.	Not having a phone or the newest trainers can have a negative affect in the persons self-image and self-esteem. They might feel isolated from others.

What we are learning this term:	
<p>N. What are life events? O. How do people deal with life events? P. How is dealing with life events supported?</p>	
N.	What are life events?
Life Events	Life events are expected or unexpected events that can affect development. Examples include starting nursery, getting married or becoming ill.
Expected Life Events	Expected life events are life events that are likely to happen. Examples include starting primary school aged four and secondary school aged 11.
Unexpected Life Events	Unexpected life events are events which are not predictable or likely to happen. Examples could include divorce and bereavement (the death of a loved one).
Physical Events	Physical events are events that make changes to your body, physical health and mobility. Examples include illnesses such as diabetes and injuries and accidents such as car accidents.
Relationship Changes	Relationship changes could be new relationships such as the birth of a sibling, a new friendship or romantic relationship. Relationship changes can also be changes to existing relationships such as divorce.
Life Circumstances	Life circumstances are different situations that arise in our life that we must deal with. Examples include redundancy (losing a job), moving house or retirement (finishing work in later adulthood).

O.	How do people deal with life events?
Individual	<ul style="list-style-type: none"> The effects of life events vary from person to person based on how they deal with their new situation. Some people react to able to react to life events positively, others find it more difficult due to a range of factors.
Factors	<ul style="list-style-type: none"> Factors that may affect how people cope with life events: age, other life events happening at the same time, the support they have, their disposition (their mood, attitude and general nature), their self-esteem, their resilience (how quickly they recover).
Adapting	<ul style="list-style-type: none"> Adapt – to adjust to new conditions or circumstances. Expected on unexpected life events can often force people to make changes to their lives. Individuals must find their own way to adapt to the changes that life throws at them.
Resilience	<ul style="list-style-type: none"> Resilience – a person's ability to come to terms with, and adapt to, events that happen in life. Resilience is stronger in people who have a positive outlook on life, accept that change happens, has supportive family and friends and plans for expected life events.
Time	<ul style="list-style-type: none"> Sometimes people need a long time to adapt to unexpected life events. It can take time for people to move on from and accept difficult changes in their life.

P.	How is dealing with life events supported?
Types of Support	How this helps individuals deal with life events
Emotional Support	Emotional support is needed to help individuals deal with all life events – expected and unexpected. Having someone to talk to helps people feel secure and adapt to change. Sometimes individuals can find this support in family and friends or professionals to process difficult life events – such as bereavement.
Information and Advice	Life events, particularly unexpected ones, can cause people to feel like they do not know what to do. Information and advice can help people to have a better understanding of their situation, which allows them to deal with it more successfully. Information and advice help them know where to go for help, the choices that are available to them and how to make healthy choices.
Practical Help	<ul style="list-style-type: none"> Financial help – an individual may need money to help them adapt to a life change i.e. money to pay for a stair lift if their mobility has been effected. Childcare – an individual may need support looking after their children i.e. a lone parent after a divorce that needs to go to work. Transport – an individual may need support with transport if they have mobility problems i.e. a car could be adapted to support a person who has had an accident and can no longer walk.
Informal Support	Informal support is the support an individual receives from partners, family and friends. It is usually the first form of support an individual experiences after an expected or unexpected life event. Informal support can provide reassurance, encouragement, advice, a sense of security, someone to talk through options with and practical help.
Professional Support	Formal support may be provided by statutory care services (the state), private care services and charitable organizations. Professional support may include counsellors, teachers, careers advisers, occupational therapists, social workers and health specialists. Professional support may be needed to help people with a health condition, regain mobility, deal with life changes and emotions, get advice and information or change their lifestyle.
Voluntary Support	Organizations offering voluntary support are charities, community groups and religious groups. At voluntary support services, many staff are volunteers (they work for free), but they also employ qualified people who are paid by donations. Community groups work at a local level to meet the needs of people living in a specific neighbourhood i.e. foodbanks. Religious groups are formed by people who share the same religious or spiritual beliefs but they help all people in need regardless of their beliefs and background i.e. a church run soup kitchen for the homeless.

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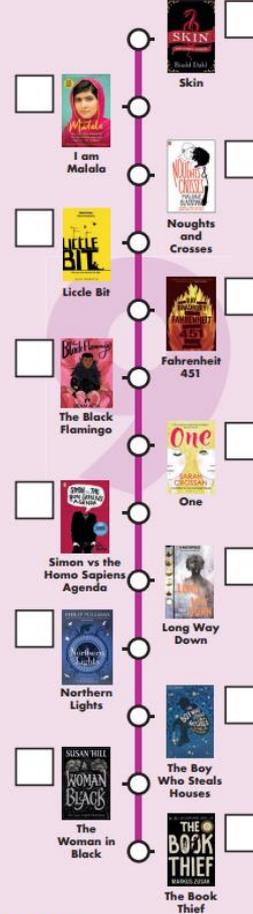
Year 7



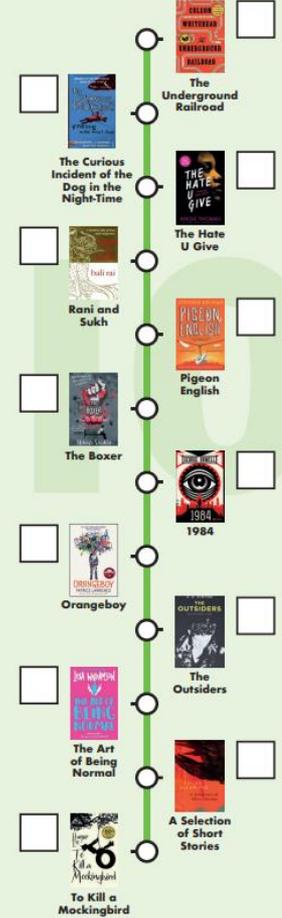
Year 8



Year 9



Year 10



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