YEAR 10 CYCLE 2 BIOLOGY

Year 10 Separate Biology Cycle Two

Key Vocabulary

1. **Cataracts:** a cloudy patch on lens meaning light struggles to enter eye and impairs vision
2. **Chromosome:** made up of tightly coiled DNA
3. **Clone:** an organism which is genetically identical to its parent
4. **Central nervous system:** CNS. Comprised of the brain and spinal cord
5. **Differentiation:** a term for specialisation. When a non-specialised cell develops specialised features
6. **Diploid:** two sets of chromosomes; 23 pairs
7. **Gamete:** a sex cell; the sperm in males and the egg in females
8. **Gene:** a short section of DNA
9. **Haploid:** one set of chromosomes; 23 only, found in the nuclei of gametes
10. **IVF:** In vitro-fertilisation; when fertilisation happens outside the human body
11. **Long- sightedness:** when people cannot focus on close objects. The eyeball is too short
12. **Neurone:** a nerve cell. There are three types
13. **Neurotransmitter:** a chemical which diffuses across synapses
14. **Receptor cell:** these are cells in the sense organs that detect stimuli, e.g. the receptor cells for light are in the retina of the eye
15. **Short-sightedness:** people who cannot focus on objects that are far away, the eyeball is too long
16. **Somatic cell:** a normal body cell. Has a diploid nucleus
17. **Stem cell:** an unspecialised cell that can differentiae into any specialised cell
18. **Stimulus:** a change in the environment
19. **Synapse:** a gap between two neurones that electrical impulses cannot pass.

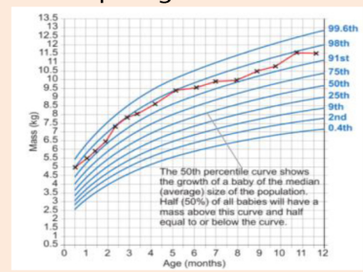
Week One

1. **Mitosis** is a form of cell division so organisms can **grow, replace** dead cells and **repair** damaged ones.
2. Mitosis create **2 genetically identical diploid** daughter cells.
3. These are the stages of mitosis:

a) Interphase: duplication of DNA
b) Prophase: breakdown of the nuclear membrane
c) Metaphase: chromosomes line up in the middle of the cell
d) Anaphase: spindle fibres separate chromosomes by pulling the to either end of the cell
e) Telophase: a new nuclear membrane appears around the set of chromosomes
f) Cytokinesis: a new cell membrane forms creating 2 separate identical cells

Week Two

1. Sexual reproduction:
a) requires two parents
b) There is variation between the offspring
2. Asexual reproduction:
a) Only needs one parent
b) Relies on mitosis
c) Creates clones
3. Percentile growth charts are used to monitor and compare growth in babies .



Week Three

1. Growth in animals follow this pattern: **Cell division- Differentiation**
2. Growth in plants follow this pattern: **Cell division- Elongation- Differentiation**
3. **Differentiation** is the process of an unspecialised cell developing into a specialised cell.
4. Specialised cells are adapted to aid their function:

a) female gamete: haploid nucleus, cell membrane hardens after fertilisation, high level of nutrients in cytoplasm
b) male gamete: haploid nucleus, acrosome containing enzymes, many mitochondria, flagellum
c) Ciliated epithelial cells: contain cilia (tiny hairs) to move egg or pathogens, many mitochondria

Week Four

1. **Stem cells** are unspecialised cells which have the ability to differentiate into any type of cell.
2. There are two types of stem cells in humans:

a) Embryonic stem cells
b) Adult stem cells

3. The stem cells found in plants are called **meristems.**
4. **Embryonic stem cells** are embryos (ball of dividing cells following fertilisation). Often left over from IVF treatment.
5. These can differentiate into any type of cell.
6. **Adult stem cells** are found in any fully developed animal. These can often only specialise into the tissue that is surrounding them.
7. **Meristems** are found in the roots and shoots of plants.

YEAR 10 CYCLE 2 BIOLOGY

Week Five

1. **Stem cells** can be used in medicine to treat disease caused by damaged cells and also used to replace damaged cells.
2. **Benefits of using stem cells:**

a) Treat diseases
b) Replace torn and damaged tissue

3. **Risks of using stem cells:**

a) Chance of **rejection** if stem cells from another persons are used
b) **Ethics** surrounding the use of embryonic stem cells
c) Possibility of stem cell continuing to divide once inside the body causing tumours and then **cancers**

Week Six

1. **The brain** is made of billions of neurones which work with one another and other parts of the body to process information
The main areas of the brain are:
2. **Cerebral cortex:**

a) Front of brain
b) Divide into two hemispheres; left and right
c) Used for senses, memory, consciousness and behaviour

3. **Cerebellum:**

a) Found at the base of the brain
b) Controls balance, posture and fine motor skills

4. **Medulla oblongata:**

a) Connects the brain to the spinal cord
b) Controls heart rate and breathing rate

5. **Spinal cord** carries information between brain and body

Week Seven

1. Scanning allows us to look into the brain when there are problems.
2. **CT scans** use x-ray beams to show the shapes and structures of the brain.
3. **PET scanning** uses radioactive tracer chemicals to show which parts of the brain are functioning whilst in the scanner.
4. If the **spinal cord is damaged** then the flow of information between the brain and body can be disrupted.

a) Hard to treat; no adult stem cells can differentiate into spinal cord neurones

5. **Brain tumours** can squash parts of the brain and stop them working.

a) Some can be cut out
b) Sometimes the cells can be killed using radiotherapy and chemotherapy
c) The blood-brain filter can stop this from working

Week Eight

1. **The eye** is a sense organ containing receptor cells. The main parts of the eye:

a) **Pupil:** in the centre of the eye; where light enters
b) **Cornea:** helps to focus the light by bending it
c) **Lens:** fine-focuses and refracts light into eye
d) **Ciliary muscles:** help to change the shape of the lens
e) **Retina:** at the back of the eye contains receptor cells; rods (light intensity) and cones (detect colour)
f) **Optic nerve:** carries impulses to the brain

3. Problems with the eye can be **short sightedness, long sightedness, cataracts** and damage to retina causing **colour blindness.**

Week Nine

1. The **nervous system** enables humans to react to their surroundings and to coordinate their behavior.
2. Reflex arc:

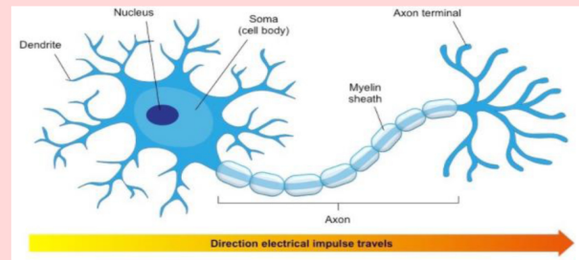
a) **Receptor cells** in the sense organs detect a **stimulus** (change in environment)
b) Information travels along **sensory neurones** in the form of **electrical impulses.**
c) The impulse travels around the **CNS** (brain and spinal cord) via **relay neurones.**
d) Information travels down **motor neurones** to the **effectors** (either a muscle or endocrine gland) to carry out a response

3. A **synapse** is a gap between two neurones; electrical impulses cannot pass this gap and so a chemical called a **neurotransmitter** diffuses across

Week Ten

1. A neurone is a specialised cell and has many adaptions:

a) **Dendrites** receive electrical impulses and cover a large surface area
b) **Myelin sheath** is a fatty layer surrounding neuron which insulates and speeds up transmission
c) **Axon terminals** have a large surface area to pass on impulses



YEAR 10 CYCLE 2 BUSINESS

Knowledge Organiser

Unit 2: Marketing

Consumer law is: the area of law which protects customers.

Week 1 Consumer law

Customers are protected by the **Consumer Rights Act 2015**. This Act of Parliament gives customers protection when they buy goods and services.

Fit for purpose
This means that goods must do what they are meant to do
As described
This means goods must be as the business describes
Satisfactory quality of goods
This means that how the goods are made will reflect the price
Reputation
What customers say about a business

Fit for purpose | As described | Satisfactory quality

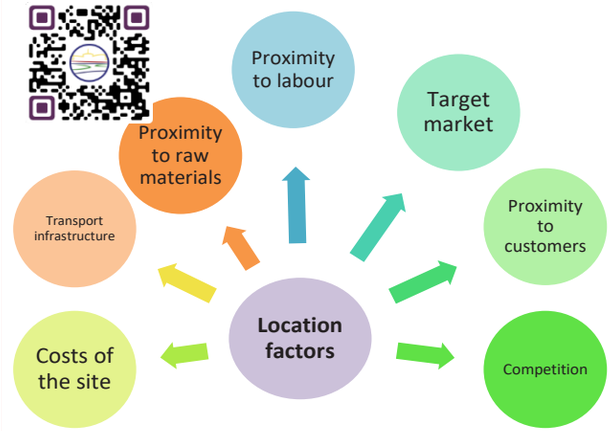
Impact of consumer law on business	
Production	A business must make sure that the quality of the goods is up to standard. They must not be faulty or damaged when bought. If they are not customer could return products and this will affect their reputation.
Safety of goods	If goods are produced in a defective way customers can claim compensation for damage or personal injury. This could result in huge costs for the business and a loss of reputation.

Location: refers to the place where a business is sited

Week 2 Business Location

For many businesses, the decision of where to locate is one of the most important decisions it takes. There are a number of factors that influence the location of a business

Proximity
Means 'nearness to'
Labour
The people employed by the business to produce goods and services
Raw materials
Materials needed to produce saleable goods and services
Transport infrastructure
The provision of roads, railways, ports and airports



Marketing is: finding the needs of customers and demonstrating how a business fulfils those needs in order to increase sales

2:1 The Role of Marketing

How can a business increase sales?

1. Advertise the product or service more in order to raise awareness of what is on offer
2. Introducing a new model that will appeal to more customers
3. Increase the range of products or services available
4. Reducing the price to sell more products - but will profits increase?
5. Selling the product in different countries to target a wider range of customers
6. Selling by different methods i.e. Online or offering digital distribution

Marketing
Finding the needs of consumers and demonstrating how a business meets those needs
Market research
The collection of data to help business decisions

2:2 Market Research

Before a business starts, it is important that the owners know exactly who their customers are likely to be.

Primary	Pros	Cons
Questionnaire	▪ Cheaper than interviews ▪ Easily target certain people	▪ Difficult to predict how many will be completed ▪ people may not understand the questions
Interviews	• Questions can be explained • Customers can be easily targeted	• Expensive • Customers may feel uncomfortable
Trials	• Save money before making products widely available	• Costly to set up
Focus groups	• Data is accurate to the target market	• Only small groups that take part so expensive

Secondary sources include census data, websites, internal data and newspapers.
Pros: cheap and already available to use
Cons: not exactly what you need and could be out of date

Target market
The group of customers who a business aims to sell its products to

Primary research
Data collected first-hand (field research)

Secondary research
Data collected by others (desk research)

Qualitative data
Data based on opinions of those being asked

Quantitative data
Data based on facts or numbers

YEAR 10 CYCLE 2 BUSINESS

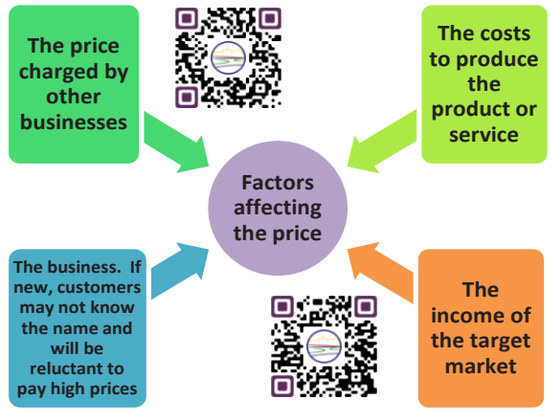
Knowledge Organiser

Unit 2: Marketing

2:4 The Marketing Mix - Price

Competitor pricing
A price is set based on prices charged by competitors
Cost-plus pricing
Adding a percentage of profit onto the total costs of making a product
Penetration pricing
A price is set lower than competitors
Skimming
A high price is charged initially for those customers who want the latest products
Promotional pricing
Prices are reduced to give sales a boost

A business must take great care when setting the price of products and services. Too low and the business won't make enough profit, too high and customers will not buy



2:4 The Marketing Mix - Place

Place is: concerned with where the product is sold from and the distribution of goods

Physical distribution
Distribution of goods using a physical presence

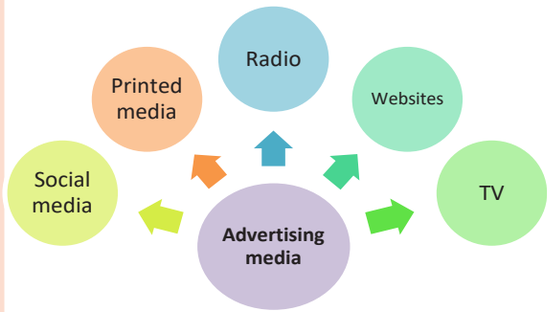
Digital distribution
Distribution of goods and services digitally by downloading from a website

Advantages of digital distribution	Disadvantages of digital distribution
▪ Customers can access products and services 24/7 ▪ Goods are downloaded so available quickly ▪ No physical product to deliver so the business saves money	▪ Not all goods are suitable for digital distribution i.e. bread ▪ Not all customers have access to the internet ▪ Easier for illegal content to be copied and distributed which means the business loses sales

2:4 The Marketing Mix - Promotion

Aims of promotion

- To inform customers about a product or service
- To keep a business ahead of its competitors
- To create or change the image of a business, its products and services
- To maintain or increase sales



Point of sale promotions
Price reductions, loss leaders, competitions, free samples
Advertising campaign
A series of advertisements often using different advertising media
Advertising media
The methods by which a business can advertise a product

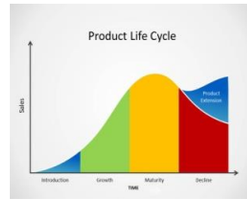
2:4 The Marketing Mix - Product

The product is a vital element of the marketing mix. The product or service must be something customers actually want.

Advertising a new product more widely can increase sales and extend the life of a product.

Reducing the price of a product can help to maintain sales and extend the life of a product.

Selling in new markets i.e. abroad, opens the product up to a wider range of new customers and so extends the life of the product



Introduction
A product is first made available for sale
Growth
Sales are growing strongly
Maturity
Sales are at their highest level
Decline
Sales are falling

YEAR 10 CYCLE 2 CHEMISTRY

Year 10 Separate Chemistry Cycle Two

Key Vocabulary

1. **Alkali:** a solution containing excess hydroxide ions (OH^-),
2. **Base:** a substance that will react with an acid to form only salt and water
3. **Concentrate:** a high concentration of solute in a solution
4. **Concentration:** the amount of solute per unit volume
5. **Dilute:** a low concentration of solute in a solution
6. **Filtrate**: a solution that is passed through a filter funnel
7. **Filtration:** using a filter to separate an insoluble solid from a liquid
8. **Ion:** an atom with an electrical charge due to the gain or loss of electrons
9. **Neutralisation:** a reaction in which an acid reacts with a base to produce a salt and water only
10. **Oxidation**: loss of electrons or the gain of oxygen
11. **Reduction**: gain of electrons or the loss of oxygen
12. **Residue:** material remaining in the filter after a mixture has passed through it
13. **Soluble**: a substance that can dissolve
14. **Strong acid**: an acid that will dissociate completely into ions when it dissolves
15. **Titration:** a technique in volumetric analysis that is used to find the exact volumes of solutions which react with each other
16. **Weak acid:** an acid that will not dissociate completely into ions when it dissolves

Week One

1. **Indicators** are used to determine whether a solution is **acid**, **alkaline** or **neutral.**
2. **Acids** contribute **hydrogen ions (H^+)** and have a **pH** between **1-6.**
3. **Alkalis** contribute **hydroxide ions (OH^-)** and have a **pH** between **8-14.**
4. **Neutral** substances have a **pH** of **7.**
5. The **higher** the **concentration** of **hydrogen ions** the **lower** the **pH.**

Colours of different indicators in acid and alkali

Indicator	Acid	Alkali
Universal indicator	Red	Blue
Litmus	Red	Blue
Phenolphthalein	colourless	Pink
Methyl orange	red	yellow

Week Two

1. A **base** is any substance that reacts with an **acid** to form **water** and **salt only** in a **neutralisation** reaction.
2. **Acid + base → salt + water**
3. **Copper oxide + sulfuric acid → copper sulfate + water**
4. Add the **base** in **excess** to ensure all the solid reacts.
5. The **unreacted** solid (**residue**) is removed using a filter funnel.
6. The liquid that has been filtered (filtrate) contains **salt** and **water only.**
7. A **soluble** salt is one which will **dissolve** in **water.**

Week Three

1. **Acid + base → Salt + water**
2. **Copper oxide + sulfuric acid → Copper sulfate + water**
3. **Heat** the acid before the copper oxide is added to ensure all of the copper oxide **reacts**
4. **Stir** the mix after the copper oxide is added so that is **dissolves**
5. **Filter** the mix to remove the excess copper oxide, leaving the **residue** in the filter paper
6. Heat the evaporating basin over a beaker of water to prevent the salt solution from **spitting**
7. The **larger** the crystals that form the **slower** it took the water to evaporate

Week Four

1. Alkalis are **soluble** bases
2. **Neutralisation** is a reaction between an **acid** and a **base**
3. **Acid + metal → salt + hydrogen**
4. **Acid + metal oxide → salt + water**
5. **Acid + metal hydroxide → salt + water**
6. **Acid + metal carbonate → salt + water + carbon dioxide**
7. (aq) – aqueous
8. (l) – liquid
9. (s) – liquid
10. (g) - gas

YEAR 10 CYCLE 2 CHEMISTRY

Week Five

1. When carrying out a reaction to form a **soluble salt**:
    a) the **acid** is gently **warmed** so the reaction occurs **faster**
    b) the **solid** reactant is added in **excess** to **ensure all** of the **acid reacts**
    c) the **excess solid** is them **filtered** using a **filter funnel** and **filter paper**
    d) the **filtrate** is the **liquid** which passes through the filter funnel
    e) the **filtrate** is **poured** into an **evaporating basin** to be **heated**
    f) the **evaporating basin** is heated over a beaker half full of water – to **prevent spitting**
    g) The **filtrate** is heated to form a **concentrated salt** solution

Week Six

Neutralisation Core Practical

1. Use a **measuring cylinder** to measure **50ml** of hydrochloric acid to a **beaker.**
2. **Estimate** and **record** the **pH** of the contents of the beaker.
3. Put a piece of **universal indicator** paper onto a **white tile.**
4. **Dip** the end of a **glass rod** into the liquid, then tap it onto **the universal indicator paper.**
5. Wait **30** seconds, then match the colour to the appropriate **pH** on the pH chart.
6. Rinse the glass rod with water.
7. Measure **0.3g** of calcium hydroxide powder add to the acid and **stir.**
8. **Repeat** steps 2 and 3 until **2.4g** has been added.

Week Seven

Variations to the method of the neutralisation core practical

1. This can be completed with any acid and any base.
2. A **pH probe** can be used to get a more **accurate** measure of the pH.
3. More accurate results an be obtained by using a different **glass rod** each time to **stir** the solution.
4. You must ensure all of the powdered base has **dissolved** before testing the **pH.**
5. The **white tile** is used to make the colour change seen with the universal indicator paper **more clear.**
6. The **mass o**f calcium hydroxide can be plotted against the **pH** to form a **calibration curve.**

Week Eight

1. **Acid + metal carbonate → salt + water + carbon dioxide**
2. Test for **hydrogen**: place a **lit splint over** the top of a test tube, you will hear a **squeaky pop** if **hydrogen** is **present.**
3. Test for **carbon dioxide**: **bubble** the gas though lime water, the solution will go **cloudy white** if it is present.
4. Acid-alkali **titration** is used to form a **soluble salt.**
5. The acid and **soluble** reactant are mixed in **correct proportions** to form a salt and water.
6. (l) – liquid
7. (s) – solid
8. (g) – gas
9. (aq) – aqueous

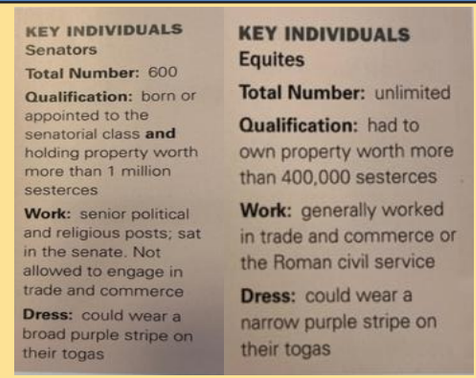
Week Nine

1. **Solubility** rules:
    1. all sodium, potassium and ammonium salts are soluble
    2. all nitrates are soluble
    3. all chlorides are soluble except silver and lead are insoluble
    4. common sulfates are soluble except lead, barium and calcium
    5. common carbonates, hydroxides are insoluble except sodium, potassium and ammonium
2. **Ionic** bonding:
    a) is the **transfer** of **electrons** to gain a full outer shell forming oppositely charged particles that attract due to **electrostatic forces of attraction**
    b) occurs between a **metal** and a **non-metal**
    c) forms substances with have **high melting** and **boiling** points

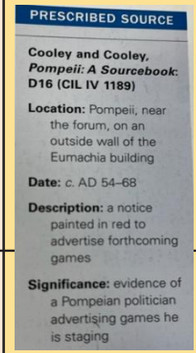
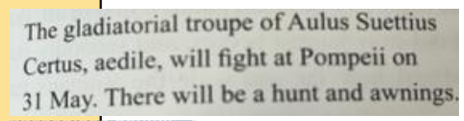
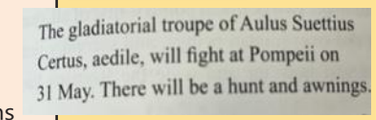
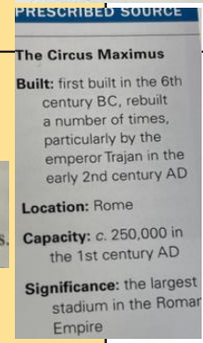
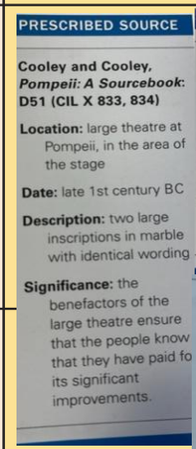
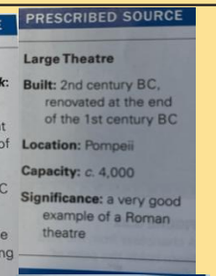
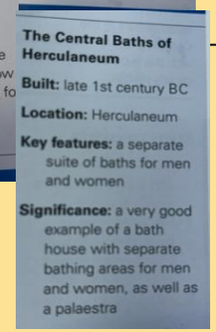
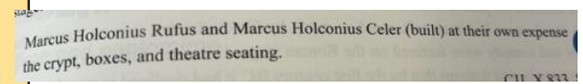
Week Ten

1. When ionic substances are **molten** or dissolved in solution they **conduct electricity** because the **free electrons** can carry a **current**.
2. For a substance to **conduct** electricity:
    a) It must contain **charged particles**
    b) These particles must be **free** to move
3. Ionic substances will **not conduct electricity** in their **solid** form because their **ions** are **not free** to carry the current.

YEAR 10 CYCLE 2 CLASSICS

	Key Ideas	Prescribed Sources/Key Sources	Key Vocabulary
1. Roman Citizens and public officials	• Roman society was heavily divided by class and status. • The highest group in the Roman class structure was the senators. followed by the equites, then the plebeians. • The highest public official in Rome was the consul, followed by the praetors, then the magistrates.		• **Consuls (noun):** The highest elected public official in Rome. • **Praetor (noun):** A praetor was an elected magistrate who held legal power in ancient Rome, serving under the authority of consuls. • **Magistrates (noun):** An elected politician in Rome. • **Senators (noun):** Members of the highest social class in Rome; a senator had to own property worth at least 1 million sesterces. • **Equites (noun):** Members of a specially privileged class of citizens in ancient Rome who often owned property. • **Plebeian (noun):** A Roman commoner.
2. Slaves in Ancient Rome	• Slaves were an accepted part of Roman life and were central to supporting the Roman economy. • You could become a slave by being born into it, being a captive of war, being abandoned as a baby, being kidnapped or by being a convicted criminal. • Broadly speaking, there were 3 groups of slaves in Ancient Rome: Domestic slaves, Industrial slaves and Public slaves.	**An inscription by a freedman for an election candidate** In this inscription, Ceratus identifies himself as a freedman and declares his support for Publius Vedius Nummianus as aedile, the second highest political office in Pompeii. Given that he identifies himself as a freedman, it is likely that Nummianus is the former master he still works for: Ceratus, freedman, asks for Publius Vedius Numm[ianus] as aedile. CIL IV 910 PS	• **Domestic slaves**: Often lived in a private house and educated children. Men would help the pater familias and women would complete housework. • **Industrial slaves:** Stronger males. Worked in factories, mines, farms etc... • **Public slaves:** Owned by the state. Upkeep temples, baths and other public buildings etc...
3. Freedmen	• Roman society was unusual as it offered the hope of freedom for slaves. • Slaves could buy their freedom after a long period of service OR their master may decide to free them. • Ex-slaves were known as freedmen and would often still be tied to their old master by being a client. • Freedmen were not allowed in public office other than having the role of an Augustale who carried out religious duties and preserved the honour of the emperor.	Naevoleia Tyche, freedwoman of Lucius, for herself and for Gaius Munatius Faustus, *Augustalis* and Country District Dweller, to whom the town councillors with the consent of the people decreed an honorific chair for his merits. Naevoleia Tyche had this monument in her lifetime for her own freedmen and freedwomen and for those of Gaius Munatius Faustus. ***PS:*** *The Tomb of Naevoleia Tyche, including the inscription.*	• **Freedmen (noun):** In ancient Rome it existed as a distinct social class, with former slaves granted freedom and rights through the legal process. • **Augustales (noun):** Roman public officials connected to preserving the honour of the emperor. They were mostly freedmen.
4. Amphitheatres (Colosseum)	• The Colosseum is the most famous amphitheatre and is situated in the heart of Rome. It was built AD70s and opened AD80s. • The Romans called it the "Flavian Amphitheatre" for the name Flavius, which was the family name of emperor Vespasian who commissioned the building in 70s AD. • The Colosseum is the largest amphitheatre in the Roman Empire, holding a capacity of 50,000.	***PS:*** *The Colleseum* ***Built:*** *AD70s and opened AD80s* ***Location****: Rome* ***Name:*** *Called the "Flavian Amphitheatre by the Romans after the emperor Titus Flavius Vespasianus (known as Vespasian)* ***Capacity:*** *50,000* ***Significance:*** *Largest amphitheatre in Rome*	• **Amphitheatre (noun):** An open circular or oval building with a central space surrounded by tiers of seats for spectators, for the presentation of dramatic or sporting events.

YEAR 10 CYCLE 2 CLASSICS

	Key Ideas	Prescribed Sources/Key Sources	Key Vocabulary
5. Sponsorship / Types of shows	• Gladiatorial games were closely associated with the power of the emperor. Even before the time of emperors, senior politicians would campaign for votes by promising impressive games. • Wild animals were a key feature of games. It was a source of pride if an emperor could bring an exotic dangerous beast. • Executions of convicted criminals was also presented as entertainment.	 	• **Sponsorship (adjective):** Using money to support something. • **Execution (verb):** To carry out the sentence of death.
6. Gladiators and Chariot Racing	• Gladiators came from a variety of background. Some were slaves, others convicted criminals, others prisoners of war and even free men who signed up to escape poverty. • Training was immensely tough and they would spend hours practising fighting drills with blunted wooden swords. • Chariot racing was a big part of Roman society. Romans would like to believe it was introduced by the founder of Rome – Romulus.	 	**Gladiator (noun):** A man trained to fight with weapons against other men or wild animals in an arena. **Infamis (adjective):** literally 'shameful' or 'disgraceful', the very low legal status given to a group of Romans including gladiators, charioteers, actors or prostitutes.
7. The Theatre	• Roman drama was highly influenced by the drama of ancient Greece. Plays were often put on during festivals. • Pompeii had its own theatre district, with 2 theatres next to each other in the southern end of the city. • There is no conclusive evidence about the types of plays performed in the large theatre of Pompeii. However, drama was clearly popular in the city. Tragedy and comedy also featured on the Roman stage.	   	• **Scaenae frons:** The back wall of a stage, usually 2 or 3 storeys tall with elaborate decoration. • **Orchestra (noun):** The semi-circular area in front of the stage normally reserved for VIP seating. • **Stock character:** A character in a work of literature or drama who is easily recognisable as a particular type of person from certain behaviour traits.
8. The Baths	• Baths were a large part of Roman life. One source claims that there were nearly a thousand bath complexes. • A bath was where people went to be seen. A wealthy man may have arrived accompanied by freedmen and slaves in a show of power and status. • The Central Baaths of Herculaneum were built in the late 1st BC and are an example of how a bath house would have separate bathing areas for men and women, as well as a palaestra.		• **Apodyterium (noun):** Changing room in baths complex. • **Palaestra (noun):** exercise-ground. • **Tepidarium (noun):** warm room in baths complex. • **Caldarium (noun):** the hot room in the baths complex. • **Frigidarium (noun):** Cold room in the bath complex. • **Strigil (noun):** A curved scraper to remove oil and dirt from body. • **Hypocaust (noun):** Underfloor heating system.

YEAR 10 CYCLE 2 DESIGN TECHNOLOGY

Year 10 Design Technology Cycle Two Key Vocabulary	**Automation** A process to improve efficiency, reliability and speed of tasks previously carried out by humans	**Innovation** The creation of a new product, with the aim of improving efficiency, effectiveness or competitive advantage.	**Digitisation** The automation of existing manual/paper-based processes from an analogue to a digital format.	**Longevity** How long a product is used for without failing. Also, how long a product remains in the market place	**Ethics** Well-founded standards of right and wrong that prescribe what designers ought to do in terms of rights, obligations, benefits to society and fairness.

Week One

1. Automation: Robotic manufacturing processes that offer significantly greater consistency, accuracy, reliability and productivity than human workers.
2. Cooperatives organisations or businesses that are owned and run by its members.
3. Fairtrade ensures better prices, decent working conditions and fair terms of trade for farmers and workers in less economically developed countries.

Week Two

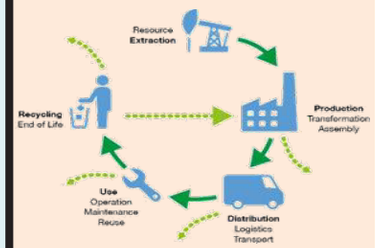
1. Non finite resources are those that are unlikely to be exhausted, or those that are replaced faster than we can use them.
2. Continuous improvement is an approach that seeks to continually improve and develop products, services and procedures for the better.
3. Inclusive design Designs which are developed to be easily used by the elderly or disabled people.

Week Three

1. Technology push
Research and development in new **technology**, drives the development of new products.
2. Market pull
Consumer driven pressure causes manufacturers to continuously develop new products or add functionality to existing products.
3. Cobots
Collaborative robots allow greater human-robot interaction. They work with humans rather than for them to significantly improve productivity.

Week Four

Life cycle assessment (LCA)
Evaluates the environmental impact of a product.



Planned obsolescence
Products that are only built to last a short amount of time.

Week Five

1. Computer Aided Design (CAD)
CAD software is used to create precision 2D or 3D drawings, models or technical illustrations.
2. Computer Aided Manufacture
CAM uses Computer Numerical Control (CNC) and CAD files to generate 3D tool paths for the machinery to follow.
CAM machinery includes laser cutters, embroidery machines, CNC milling machines, routers and lathes.

Week Six

Flexible manufacturing systems (FMS) involves an assembly of automated machines commonly used on short-run batch production lines where the products frequently change.
Lean Manufacturing aims to manufacture products just before they are required to eliminate areas of waste.
Just In Time Production (JIT) Items are created as they are demanded. No surplus stock of raw material, component or finished parts are kept.

Week Seven

User centred design
The focus of user-centred design is the client or user group.
Systems approach to design represents a sequence of actions, often based on an input-process-output model
Iterative design cycle enables the designer to refine their work in progress.

Collaborative Design is working with others to greatly increase creativity.

Week Eight

Design movement is a style in art or design that upholds a specific philosophy or ideal and is followed and promoted by a group of artists for a defined period of time.
Iconic design.
Iconic Design is a design that is 'ground breaking' and one that sets new standards in its field. It is a design that becomes a bench mark for other similar products.

Week Nine

Designing and design decisions:
1. **Ergonomics** is the process of designing or arranging products so that they fit the people who use them.
2. **Anthropometrics** is the measurement of body sizes at rest and when using products and furniture.
3. **Prototype:** is a first or preliminary version of a product which can be modified further.

Week Ten

Designing and design decisions:
1. **Quality control (QC)**
Process to check quality against a set standard or specification: the quality of the product at different stages of production.
2. **Quality assurance (QA)**
Does **not** check the quality of the final product but the quality of all systems on the production line, staff training and quality monitoring.

YEAR 10 CYCLE 2 FOOD & NUTRITION

GCSE Food Preparation and Nutrition
Topic: Nutrition

Macronutrient vs Micronutrient

What is a micronutrient?
A micronutrient is a nutrient which you need in **SMALL** amounts. Any vitamin and mineral is a micronutrient, as we don't need them in large amounts. They are mainly found in fruit and vegetables.

Examples of vitamins are vitamin A, vitamin C. Examples of minerals are calcium and iron.
The amount of micronutrients a person needs is far less than a gram, it wouldn't show up if we placed it on a weighing scale. We measure vitamins and minerals in micrograms (mg). A microgram is 1/1000 of a gram.
Tiny.

What is a macronutrient?
We also need macronutrients. These you need in **LARGE** amounts. There are only 3 macronutrients and we need these in much larger quantities than micronutrients.


Protein


Carbohydrates


Fats

Carbohydrates

Carbohydrates are essentially sugars, but their chemical structure determines whether they are just a sugar, a starch or fibre. Carbohydrates are made in plants during photosynthesis. Glucose is a single unit of sugar. Glucose is what makes up carbohydrates!

THERE ARE 3 TYPES:

Sugars (and food with sugar added)

Starches (bread, rice, cereals, root vegetables)

Fibre (wholegrain foods and skins of fruit/veg)

	Function	Sources	Excess and deficiency
Carbohydrate	We need carbohydrates to provide us with **energy.** Carbohydrates are made in plants during a process called **photosynthesis**. They are also known as a **protein sparer**. This is because our body will use protein as **energy** if we have not got enough carbohydrates in our diets, but this stops protein carrying out its primary function of and repair.	There are 3 types of carbohydrate . They are **sugars, starches,** and **dietary fibre.**	Excess carbohydrates can cause **obesity** which can lead to health problems such as **diabetes.** Deficiency can cause **weight loss** and also means the body cannot grow and repair as well because **protein** will be used for energy. Lack of fibre can cause bowel cancers and constipation.

Monosaccharide, disaccharides, polysaccharides

The chemical names for carbohydrates depends on their structure.
Mono = one, di = two, poly = multiple.

Monosaccharides = have one unit of sugar
Glucose and fructose are monosaccharides.

Disaccharides = have two joined units of sugar
Lactose and sucrose are disaccharides.

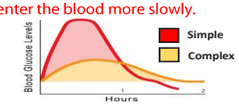
Polysaccharides = are a chain of multiple sugars
Starches and wholegrain foods are polysaccharides

Simple and complex carbohydrates

SIMPLE CARBOHYDRATES:
Digested quickly so cause a spike in blood sugar levels so energy levels spike and then drop quite soon after. Any monosaccharide or disaccharide is a simple carbohydrate are they are easy to digest. Examples of simple carbohydrates would be any carbohydrate which falls into the 'sugars' category.

COMPLEX CARBOHYDRATES:
Need to be broken down into single glucose molecules first so digested slowly. Slow and steady release of energy. Any polysaccharide is a complex carbohydrate as they are a chain of sugar molecules which are harder to digest, therefore enter the blood more slowly.

Starches and whole grain foods are complex carbohydrates.



Fibre

Non starch polysaccharide (NSP) is another name for dietary fibre.

Fibre is essential for our digestive system as it helps move waste food along so that it is removed easily.

Insoluble fibre: dietary fibre which helps prevent constipation.

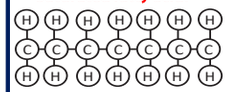
Soluble fibre: dietary fibre which helps reduce cholesterol.

Fats

	Function	Sources	Excess and deficiency
Fats	Fats have an essential role in the body. We need them for warmth as they provide a layer of insulation under our skin. We also need fat to protect our organs from damage. It also provides a concentrated source of energy. 1g of fat provides 9 kcals of energy.	There are both animal and plant sources of fats. Generally animal fats are saturated fats which are considered more unhealthy than plant sources of fats which are unsaturated fats.	Excess fat can be harmful as it can lead to health conditions such as obesity, high cholesterol, heart disease and heart attacks. Deficiency of fat can cause weight loss and a deficiency of fat soluble vitamins (a group of vitamins which are stored in body fat).

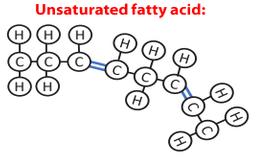
The chemical name for a fat molecule is a triglyceride. A triglyceride is made up of three fatty acid strands. The chemical structure of these strands determine whether it is saturated or unsaturated.

Saturated fatty acid:



The term saturated means carbon surrounded by hydrogen. This means they are SOLID at room temperature.

Unsaturated fatty acid:

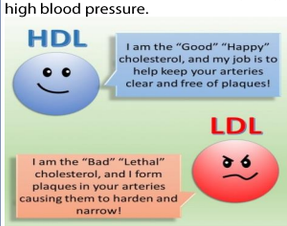


Unsaturated fats are NOT surrounded by hydrogen because they contain some double bonds. These bonds do not allow hydrogen to saturate the carbon, and create gaps. This creates flexible molecules meaning these are LIQUID at room temperature.

Cholesterol

Cholesterol is a fatty, waxy substance which travels around the body and helps form cells and absorb vitamin D. There are 2 types of cholesterol, HDL (High density lipoprotein) and LDL (Low density lipoprotein).

HDL = Found in unsaturated fats and help to reduce the risk of coronary heart disease (CHD), strokes and high blood pressure.



LDL = Found in saturated fats and can cause heart disease, strokes and high blood pressure as they build up as plaque in arteries and block them!

Protein

	Function	Sources	Excess and deficiency
Protein	The main function of protein is the **growth** and **repair** of all body cells. Other functions include being used as an **energy** source when the body does not have enough carbohydrates and also making **hormones** and antibodies. It is especially important that **babies** and **children** get enough protein as they are still growing. **Pregnant** women require more protein as they are growing a baby. **Breastfeeding** mums also require more as they are **lactating** (producing milk) for the child.	There are both **animal** and **plant** sources of protein. Animal proteins are **high biological value** (contain all 20 amino acids). Plant sources are **low biological value** (only contain some of the amino acids needed).	Protein deficiency causes **kwashiorkor.** It can lead to bloated stomach and thin limbs. It is a problem for children in **developing countries**. Excess protein can cause **kidney and liver damage.**

Protein Complementation

Protein is made of building blocks called amino acids. We need 20 in total. There are two types of amino acids, ones our bodies can make themselves and ones we need to get from our diets.

- **Non – essential amino acid:** Amino acids which are made by the human body so are not needed in the diet.
- **Essential amino acid:** Amino acids which are not made by the human body so are needed in the diet.

Depending on the amount of amino acids present in the protein, they can be split into two categories:
HIGH BIOLOGICAL VALUE: Animal proteins contain all 20 of the amino acids we need, so are know as high biological value. They can be high in fat however.

LOW BIOLOGICAL VALUE: Plant proteins do not contain all of the amino acids, it is important to mix and match plant proteins together so that you can get all of the amino acids you need. This is known as protein complementation.

LBV + LBV = HBV meal
We should aim to complement two LBV proteins together as this increases the amount of amino acids in the meal, meaning that protein can fully function.

YEAR 10 CYCLE 2 FOOD & NUTRITION

Vitamins

Vitamin	Function	Sources	Excess/deficiency
Vitamin A	An antioxidant which is stored in the liver. It helps to keep our skin healthy. It also helps our vision in dim light.	Red and yellow vegetables such as carrots and peppers. Yellow fruits, eggs, milk, liver and products made using it such as pâté.	Pregnant women should avoid eating too much as it can be toxic to a baby. Deficiency is very rare in the developed countries but if this happens then night blindness can occur.
Vitamin C	Also an antioxidant. It helps our body heal and repair. It helps our body to absorb iron.	Lots of fruits such as oranges and other citrus fruits. Also vegetables such as broccoli, potatoes and sprouts.	Deficiency is very rare in developed counties but it can cause scurvy. This is when wounds may fail to heal, gums swell and teeth fall out.
Vitamin D	Vitamin D helps our body to absorb calcium. It helps to grow and heal bones and teeth.	Also known as the sunshine vitamin as we got most of it from the suns rays. We also get it from milk, eggs and fortified cereals and spreads.	A deficiency of vitamin D can cause rickets in children. This is when the bones become soft and as a result bend.
Vitamin E	An antioxidant vitamin which helps to prevent cancers and disease. Helps maintain healthy eyes and skin.	Found in plant oils – such as soya, corn and olive oil, nuts and seeds. Also found in cereals.	No known problems with excess but deficiency can lead to poor eye/skin health.
Vitamin B group	The B vitamins help to release energy from food. They help to keep the nervous system healthy.	Fortified breakfast cereals, milk, cheese, eggs, chicken and fish.	Beriberi is a disease caused by deficiency of Vitamin B1. This disease causes muscles to waste away and mostly happens in developing countries.
Folate (A type of vitamin B, also known as folic acid.)	Helps to reduce the risk of nervous system problems in unborn children. It also works with other B vitamins to make new blood cells.	Fortified breakfast cereals and green vegetables such as broccoli, sprouts and spinach.	Can cause spina bifida in babies if the mother does not eat enough folate. This is when the babies spine does not form correctly and can lead to paralysis.

Minerals

Mineral	Function	Sources	Excess/deficiency
Calcium	Calcium works alongside vitamin D to help develop strong and healthy bones. Without this vitamin, our bodies cannot absorb calcium.	Calcium is found in milk, so any products made using milk also contain calcium. This includes dairy foods such as cheese, butter, cream. Green leafy vegetables such as broccoli and spinach also contain lots of calcium.	In children, too little calcium can cause rickets. In adults and elderly it can cause something called osteoporosis. This is when bones aren't as dense so they are weak and can break/facture easily.
Iron	Iron is needed for making red blood cells, which can carry oxygen around the body. We need calcium to help our bodies absorb iron.	We can get iron for animal and plant sources. Red meats, liver and eggs are animal sources. Green leafy vegetables, seeds and nuts are plant sources. Cereals are often fortified with iron.	A deficiency is known as aneamia. This is when not enough red blood cells have been created. It causes weakness, tiredness and a pale appearance. Often effects females of a child bearing age due to menstruation.
Sodium	Salt is needed to balance the amount of water we have in our bodies.	Processed foods such as sandwich meats, microwave meals and sauces. Bread can also contain a lot of salt. Salt is also added to meals.	Excess salt is linked to high blood pressure. Salt makes the body retain water which raises blood pressure. High blood pressure can lead to strokes and heart disease.
Fluoride	Fluoride is needed to strengthen the enamel layer on the teeth and prevent tooth decay.	We get most of our fluoride from drinking water. We can also get it from saltwater fish where the bones are eaten such as sardines.	Too much or too little fluoride can cause tooth decay and can damage the enamel on teeth.

Deficiencies of micronutrients

Rickets — When children's bones become soft and bend due to lack of calcium and vitamin D.

Osteoporosis — When adults bones are less dense and become weak and brittle, meaning they break or fracture easily.

High blood pressure — When the body has excess salt so it retains water. This can lead to heart disease and stroke.

Aneamia — When the body is deficient in iron so hasn't produced enough red blood cells. This makes people tired and weak. It often affects women due to menstruation.

Tooth decay — When the body does not have enough fluoride/calcium/vitamin D so the tooth and the enamel become weak. Too much sugar speeds this up!

Scurvy — A deficiency of vitamin C causes scurvy. This is when gums swell, teeth fall out and muscles waste away.

Spina Bifida — A deformity in the spinal cord of an unborn child which can lead to paralysis.

Fat soluble and water soluble vitamins

Vitamins can be placed into two categories.

Those which are fat soluble and those which are water soluble.

Fat soluble vitamins	Water soluble vitamins
• Stored in the fat cells and the liver. • Can be lost from foods if cooked in fat. • Can be toxic if we consume too much. • Vitamins A, D, E, K.	• Cannot be stored in our bodies. • Can be lost from foods if cooked in water, • Cannot build up in toxic amounts in our body as excess leaves our body in urine. • Vitamins C and B (group).

How can we reduce vitamin loss when cooking?

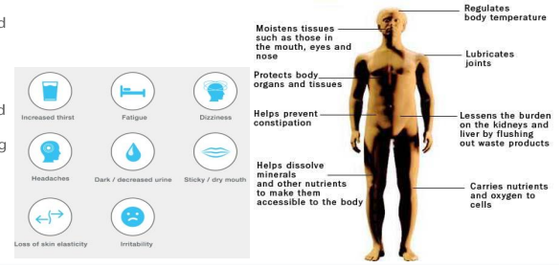
1. For foods high in water soluble vitamins, avoid cooking in water. Instead steam, roast fry or grill.
2. For foods high in fat soluble vitamins, avoid cooking in fat. Instead boil, steam or grill.
3. Prepare foods just before serving. Avoid leaving to sit in fat/water.
4. Avoid lots of cutting of vegetables. The skins help to retain vitamins.
5. Avoid peeling vegetables were possible.

Water is essential for life

Essential Functions of Water

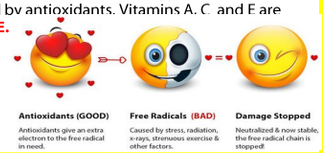
- Acts as a delivery system, taking nutrients to cells and removing waste.
- Forms the base of many bodily fluids such as blood and saliva.
- Helps regulate body temperature.
- Forms fluid surrounding joints.
- Needed for digestion, softening and dissolving food components.
- Essential for normal bowel movements and preventing constipation.
- Keeps skin hydrated.

Dehydration symptoms include: having very dark yellow urine, very dry skin, feeling dizzy, rapid heartbeat, rapid breathing, Sleepiness, lack of energy, confusion or irritability or even fainting.



Antioxidant vitamins

Antioxidants are types of vitamins which protect our body cells from damage and reduce the risk of cancer. When certain body cells are damaged, they can become 'free radicals'. These types of cells are dangerous unless repaired by antioxidants. Vitamins A, C and E are antioxidant vitamins. **A.C.E.**



Fortification

Fortification : This is when food manufacturers will add extra nutrients to food, even though they aren't present in the food naturally.

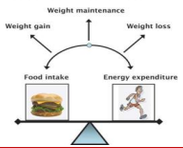
Fortified foods include bread and breakfast cereals and spreads. Some foods have to be fortified by LAW, such a flour and spreads. This is to help to health of the population. Some foods are fortified by choice, and a company just do it to encourage people to buy their foods, such as cereals.

Energy Balance

Energy is essential for fuelling our bodies. We need it to:

- To make our muscles move so we can carry out physical activity such as walking.
- To keep our bodies at the correct temperature of 37°C.
- To keep our involuntary muscles working (ones that we do not need to think bout like heart beat and breathing).
- To enable out body cells to grow and repair.

We get energy from all 3 macronutrients (carbohydrates, fats and protein) and energy is measured in calories.



Carbohydrates = 7 calories per 1 gram.
Fat = 9 calories per 1 gram.
Protein = 4 calories per 1 gram.

- **BMR** (Basal metabolic rate) is the amount of calories our body needs in order to keep all of our organs working during a day. This includes all of the calories used to breathe, sleep etc. In other words, it is the minimum amount of energy required to keep you alive!
- **PAL** (Physical Activity Level) is a measure of how active you are and how much exercise you get. If you are more active you will have a higher PAL.

$$\text{Physical Activity Level (PAL)} = \frac{\text{Total Energy Expenditure}}{\text{Basal Metabolic Rate}}$$

YEAR 10 CYCLE 2 HEALTH AND SOCIAL CARE

YEAR 10 Health and Social Care Knowledge Organiser: Component 2 Health & Social Care Services and Values

Learning Aim A: Understand the different types of health and social care services and barriers to accessing them

Providing good health and social care services is very important and a set of 'care values' exist to ensure this happens. Care values are important because they enable people to get the care they need and to be protected from different sorts of harm.

A1 Health and social care services

WEEK 1: Health care services

1. Primary care- first point of contact you have with the National Health Service (NHS) when unwell or need advice. **e.g. Dental care & doctors.**
2. Secondary & tertiary care- You may need more care than a primary service can offer. Seeing a specialist for treatment is known as secondary care. Further advanced treatment is tertiary care. **e.g. specialist medical care such as cardiology.**
3. Allied health professionals- These professionals work in a range of specialities. They support individuals experiencing both mental and physical health problems. **e.g. physiotherapy, occupational therapy, speech and language therapy.**

WEEK 2: Social care services

1. Services for children and young people- Support may not be given at home due reasons like family illness or relationship problems, so these services help. **e.g. foster care, residential care, youth work.**
2. Services for adults or children with specific needs- Where adults with specific needs such as learning disabilities or sensory impairments may need support. **e.g. residential care, respite care, domiciliary care.**
3. Services for older adults- Our bodies function less effectively as we age and we may need help. **e.g. residential care, domiciliary care.**
4. Role of informal social care provided by relatives- Not all carers are paid for what they do. Some people volunteer to help others. **e.g. friends and neighbours.**

A2 Barriers to accessing services

WEEK 3: Overcoming barriers

Barrier	How to overcome barriers
Physical	Using support aids/ Lifts & access ramps / Use services at quieter times/ inform services
Sensory	Provide information in large print/ use effective communication
Social, cultural & psychological	Have friends or family accompany the service user/ Share cultural beliefs
Language	Use an professional interpreter/ information given in own language
Geographical	Use of public or private transport/ use of hospital or voluntary transport schemes
Intellectual	Use effective communication/ Use of family, friend, carer for support
Resource	Service providers should; organise staff skills/ set up appointment reminders/ send all information to patients before appointments
Financial	Health care certificates/ prepaid health care plans/ Claim benefits

Learning Aim B: Demonstrate care values and review own practice

B1 Care values

WEEK 4: Care Values – These are a set of rules that must be followed to ensure high quality care.

1. Empowering and promoting independence by involving individuals, where possible, in making choices.
2. Respect for the individual by respecting service users' need, beliefs and identity.
3. Maintaining confidentiality by keeping personal information on a need to know basis.
4. Preserving dignity of individuals to help them maintain privacy and self-respect.
5. Effective communication that displays empathy and warmth.
6. Safeguarding and duty of care by protecting individuals for abuse and harm.
7. Promoting anti-discriminatory practice by being aware of types of unfair discrimination and avoiding discriminatory behaviour.

B2 Reviewing own application of care values

WEEK 5: Review of care values application – Assignment 2B

1. **Key aspects of a review**
   - Identifying own strengths and areas for improvement against the care values.
   - Receiving feedback from teacher or service user about own performance.
   - Responding to feedback and identifying ways to improve own performance.

YEAR 10 CYCLE 2 PERFORMING ARTS - Exploring the Performing Arts

Week 1 and 2	Week 3 and 4	Week 5 and 6	Week 7 and 8	Week 9 and 10
Sir Matthew Bourne Sir Matthew Bourne OBE is a successful choreographer and director. He creates and directs dance for musicals, opera, theatre, film as well as his own highly successful, award-winning companies. He was knighted in the Queen's New Year Honours 2016 for services to dance. **Matthew Bourne's Cinderella** A chance meeting results in a magical night for 'Cinderella' and her dashing young RAF pilot, together for just long enough to fall in love before being parted by the horrors of the Blitz. **Themes:** **Family** is one of the key themes in the original version of *Cinderella*, as well as in Matthew Bourne's version. The show is also filled with **antagonistic themes** such as: • Life and death • Good and evil • Hope and fear • Destiny and freewill	**The Paper Birds – Broke** **In their own words:** The Paper Birds are an award-winning devising theatre company with a political agenda. We pride ourselves on taking socio-political subjects and making them accessible. We are story collectors. We spend time in communities, listening to personal experiences. The words of the people we meet form the backbone of our desire to listen, to understand and then 'give voice' means not only making space for the under-represented and the misunderstood, but also that our shows explore voices from all walks of life. **Broke** Is about displaced families, gambling addictions and beans on toast. Based on interviews taken across the UK in 2014, The Paper Birds explore, with real life stories from the front line of poverty and debt, what it means to be broke.	**One Man, Two Guvnors based on The Servant to Two Masters by Goldoni** **Style: Commedia dell'Arte** It was a popular form of improvisational theatre which began in Italy in the 15th century (1400s) and is still performed today. Characters were identified by costume, masks, The classic, traditional plot is that the *innamorati* (lovers) are in love and wish to be married, but one *vecchio* (elder) or several elders, *vecchi*, are stopping this from happening, and so they must ask one or more *zanni* for help. Typically it ends happily. **Concetti** – a speech or comment by a character made directly to the audience. **Lazzi** – a well rehearsed comic routine that has no relevance to forwarding the plot and is done to get laughs. **Slapstick** – originally use of an actual stick, now means physical comedy – usually involving people falling over or getting "hurt".	**Key words to find out:** **Styles of Theatre:** *Absurdism* *Classical* *Comedy* *Commedia dell 'Arte* *Epic* *Melodrama* *Forum Theatre* *Naturalism* *Symbolism* *Theatre of Cruelty* *Verbatim* **Practitioners** *Stanislavski* *Brecht* *Artaud* *Frantic Assembly* *Berkoff* *Pinter* *Boal*	**Job Roles – Key Words** *Actor* *Artistic Director* *Backstage* *Choreographer* *Conductor* *Costume Designer* *Director* *Dramaturg* *Front of House* *House manager* *Lighting Designer* *Make-Up Designer* *Marketing Director* *Playwright* *Producer* *Property Master* *Scenic Artist* *Set Designer* *Sound designer* *Stage Manager* *Technical Director* *Wardrobe Supervisor* *Writer*

YEAR 10 CYCLE 2 PHYSICS

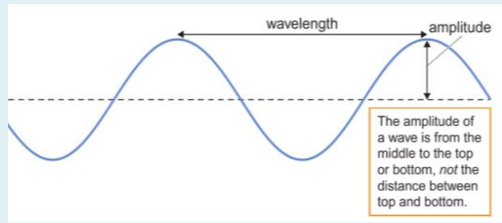
Year 10 Separate Science – Physics Cycle 2

Key Vocabulary

1. **Acceleration,:** a change in velocity over time. Measured in m/s^2.
2. **Amplitude:** maximum distance of a point on a wave from its rest position.
3. **Diffuse refraction:** refraction from a rough surface, where the refracted light is scattered.
4. **Electromagnetic (EM) Spectrum:** a group of Electromagnetic Waves divided up according to their frequency and wavelength.
5. **Equilibrium:** a situation which is not changing as all things affecting it are balanced.
6. **Focal length:** the distance from a lens to the focal point.
7. **Focal point:** the point at which parallel light rays converge after passing through a converging lens or appear to come from after passing through a diverging lens.
8. **Frequency:** number of waves passing a point each second, measured in Hertz, Hz.
9. **Incidence:** moving towards a surface.
10. **Ionizing radiation:** radiation that causes charged particles
11. **Oscillations:** movements back and forth.
12. **Period:** time taken for a wave to pass a point.
13. **Refraction:** A change in direction as a wave moves from one transparent material to another.
14. **Specular refraction:** when light is evenly refracted in the same direction, e.g. off a mirror.
15. **Speed:** distance travelled by an object in a certain time. Measured in metres per second (m/s).
16. **Velocity:** speed in a given direction.
17. **Virtual image:** an image the light rays do not pass through.
18. **Wavelength:** distance (m) from one point on a wave to the same point on the next wave.

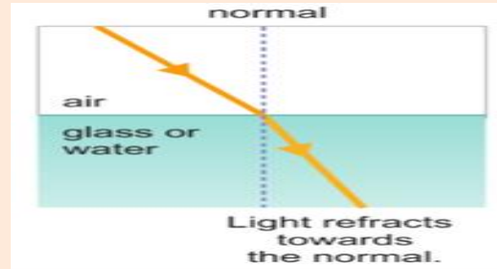
Week One

1. **Waves** transfer energy without transferring matter, described in terms of their a**mplitude, wavelength, frequency** and **period.**
2. **Transverse waves:** the direction of energy transfer is perpendicular (at right angles) to the direction the particles oscillate.
3. **Longitudinal waves:** the direction of energy transfer is parallel to (in line with) the direction the particles oscillate..



Week Two

1. **Refraction** is the change in direction of a wave due to the change of substance it is travelling through.
2. The change in direction is influenced by a change in speed of a wave.
3. The **interface** is the boundary between two mediums (e.g. solid and liquid).
4. **The normal line** is the line at a right angle (90º) to the interface.



Week Three

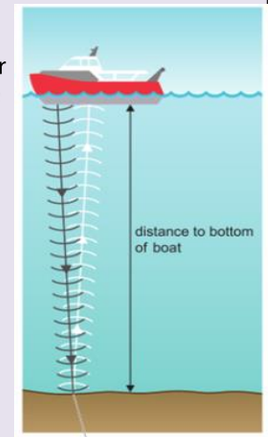
Different substances may absorb, transmit, refract reflect waves in ways that vary in wavelength.

How the ear hears sound

1. Sound waves enter the ear canal.
2. The **eardrum** is a thin membrane. Sound waves make it vibrate.
3. Vibrations are passed onto tiny bones which **amplify** the vibrations.
4. Vibrations are passed on to the liquid inside the **cochlea**.
5. Tiny hairs inside the cochlea detect these vibrations and create electrical signals called **impulses**.
6. Impulses travel along neurones in the **auditory nerve** to reach the brain.

Week Four

1. **Ultrasound** – frequency over 20 000 Hz, used in foetal scanning and sonar to judge the depth of the sea.
2. **Infrared** – less than 20 Hz, used to explore the Earth's core.



Ultrasound waves are reflected by the sea bed.

B Sonar equipment can map the shape of the sea bed.

YEAR 10 CYCLE 2 PHYSICS

Week 5

Colour and Lenses

1. White light is a mixture of colours which can be separated by a prism into the colours of the **visible spectrum**.
2. If an object reflects all the colours it is white.
3. A yellow object reflects yellow light and absorbs all the other colours.
4. **Filters** are transparent materials that absorb some colours and transmit others.
5. A blue filter transmits blue light and absorbs all the other colours.
6. A **lens** is a transparent material shaped to **refract** light.
7. The power of a lens describes how much it refracts the light.
8. A **converging lens** is fatter in the middle than the edges.
9. A **diverging lens** is thinner in the middle than at the edges.

Week Six

1. The **Electromagnetic (EM) Spectrum** consists of: **Radiowaves, Microwaves, Infrared (IR), Visible light, Ultraviolet (UV), X-rays, Gamma rays.**
2. All EM waves travel at the **speed of light**, **$3x10^8$ m/s** through a vacuum.
3. The longer the wavelength of an EM wave, the lower the frequency.
4. All EM waves have a variety of uses including communication, cooking and medical applications.
5. Some EM waves are harmful and can cause burns or damage your eyes. UV, X-rays and Gamma Rays are **ionizing radiations** and can cause cancer.

Week Seven

Radiation and temperature

1. The intensity (amount) of radiation emitted by an object increases as its temperature increases.
2. The amount of energy transferred in a certain time is the **power.** The units for power are **watts (W). 1W = 1j/s**
3. For a system to stay a constant temperature it must absorb the same amount of power it radiates**.**
4. The Earth's surface absorbs about half the radiation that reaches it from the Sun. It re-radiates this energy as infrared radiation, which can warm up the atmosphere.
5. Some gases in our atmosphere (e.g. carbon dioxide) naturally absorb some of this energy, keeping the Earth at a higher temperature, than if there was no atmosphere. This is called the **greenhouse effect.** Human activity is increasing the **greenhouse effect.**

Week Eight

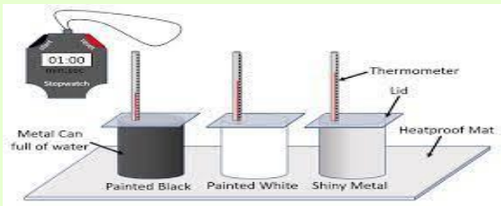
Investigating Radiation Core Practical

1. **Aim of the experiment**

To investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.

2. **Variables:**

Independent variable = Colour
Dependent variable = Temperature
Controlled variables: Identical flasks (except for their colour), same volume of hot water, same starting temperature of the water, same time interval



Week Nine - revision

1. A **force** (measured in Newtons) is an interaction that can cause a change in the motion of an object. It can be a push, pull or twist.
2. **Scalar quantities** only have a magnitude (size) e.g. mass.
3. **Vector quantities** have magnitude and direction e.g. velocity.
4. Motion of objects can be plotted on **distance/time** (d/t) graphs.
5. The **gradient** shows the speed of the object – a steep gradient shows a high speed.
6. **Speed**, **v,** can be calculated as:

$$\text{velocity (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$$

Week Ten - revision

1. **Acceleration** of an object can be plotted on a **velocity/time (v/t)** graph.
2. The gradient shows the acceleration/deceleration of an object.
3. The area under the line on a v/t graph is the distance travelled.
4. **Acceleration**, **a**, can be calculated as:

$$\mathbf{a\ (m/s^2)} = \frac{\mathbf{(v - u\ ((m/s)}}{\mathbf{t\ (s)}}$$

$$\mathbf{v^2 - u^2\ (m/s) = 2 \times a\ (m/s^2) \times X\ (m)}$$

Where v = final velocity and u = initial velocity

5. Falling objects are accelerated downwards by gravity at **9.8 m/s²**.
6. The force of gravity, **g**, is **9.8 N/kg**
7. The **terminal velocity** of a falling object is reached when the downward force of gravity equals the resistive force of air resistance.

YEAR 10 CYCLE 2 SOCIOLOGY - Crime and Deviance

Week 1: Key ideas

Crime: An illegal act punishable by law.
Deviance: Behaviour that does not conform to society's rules and norms.
Social Order: For people to live and work together a certain amount of order and predictability is needed. **Functionalists** argue this is based on value consensus.
Marxists argue that social order is maintained because of class conflict. The bourgeoise have power and control to enforce order and influence the law.
Social Control: Much of our behaviour is socially controlled.
Formal social control: Based on written rules and laws.
Agencies of formal social control:
- Houses of Parliament

Informal social control: Based on unwritten rules and processes such as approval and disapproval.
Agencies of informal social control:
- Family members
- Peers
- Teachers
- Work colleagues

Week 2: Sociological views

Functionalists: Crime is vital and necessary for all societies. It helps remind people about boundaries of acceptable and unacceptable behaviour. When the public come together over a reaction to a major crime, it creates social cohesion. (Durkheim)

Marxists: Because society is based on values such as materialism, consumerism and competition, it is unequal. Some people cannot earn enough to fit these norms and values, so they commit crimes to get them.

Feminists: Women are treated and punished as double deviants- they have firstly broken the law and second the norms that govern their gender behaviour. Arguments around the 'chivalry thesis'

Interactionalists: Labelling produces a self-fulfilling prophecy. Social groups create deviance by making rules and applying them to particular people and labelling them as 'outsiders'. Groups whose social position gives them power are able to label people.

Weeks 3 and 4: Who commits crimes?

Gender

Women committing less crime.
- Gender socialisation
- Fewer opportunities
- More responsibilities
- May be treated differently in the criminal justice system, given a lenient sentence. Chivalry thesis
- Women are treated more harshly- double deviancy, so do not commit crime.

Women's involvement in crime is increasing:
- Lost a lot of their controls and restraints.
- Women are not experiencing equality in the workplace-gender pay gap.

Ethnicity

- Inaccurate statistics
- Labelling- racism and stereotyping within the police practice.
- More ethnic groups are stopped and searched.
- Linked to their social class, minority groups possibly experience poverty and this leads to crime.
- Reporting in the media on particular groups can generate mistrust and hostility.

Class

- Inaccurate statistics
- Lower-class criminals may commit crimes that are more identifiable and more likely to be targeted by the police.
- Socialisation.
- Material deprivation - may commit crime to obtain the things others have
- Education – Working class are more likely to be in the bottom sets so may look for other routes to get what they need e.g. crime.
- Labelling
- White collar crime is not as easily identifiable as crimes committed at lower levels.

Age

- Status frustration- lack of independence.
- Lack of responsibilities can lead to deviant and criminal behaviour.
- Peer Pressure
- Thrill seeking and risk-taking. Getting a "buzz" from committing a crime or deviant behaviour.
- Socialisation- Some young people are inadequately socialised and have learned criminal behaviour as a norm or value.
- Police stereotyping

Week 5: The media

1. Is the media biased in its presentation of crime?

- The media sets the agenda in terms of what is seen to be important.
- The media is more likely to report stories involving children, violence, celebrities, local interest, and graphic images.
- 46% of media reports are about violence or sexual crimes, yet these only make up for 3% of crime recorded by the police (Ditton & Delphy 1983)
- 'Deviancy amplification' is used to describe the impact of the media on the public perception of crime.

2. Does the media create crime?

- Media content can have a negative impact on the behaviour of young people and children.
- Some people may imitate violence and immoral or antisocial behaviour seen in media. The media is regarded as a powerful secondary agent of socialisation.
- Video games are often blamed as a link between increased aggressive behaviour and crime.

YEAR 10 CYCLE 2 SOCIOLOGY - Crime and Deviance

Week 6: Key thinker – Albert Cohen (1955) (Functionalist)	**Week 7: Key thinker - Robert Merton (1938) (Functionalist)**	**Week 8: Key thinker – Pat Carlen (1988) (Feminist)**	**Week 9: Key thinker - Frances Heidensohn (1985, 1996) (Feminist)**	**Week 10: Key thinker - Howard Becker (1997) (Interactionist)**
This functionalist study explores why working-class boys join delinquent subcultures and, as a result, are more likely to commit crimes. Cohen notes that working-class boys are much less likely to achieve at school than middle-class children. For Cohen this is down to **cultural deprivation** - working-class attitudes to school and education. Because these pupils don't get the status they crave, they form delinquent subcultures. For Cohen, to gain status, the members turned mainstream values on their head. So, things that would be viewed as bad in mainstream society - like vandalism and truancy - are viewed as good within the subculture. Cohen's theory is often referred to as **status frustration** and is used to explain why young working-class males are more likely to commit crimes than other people, why they do it in groups, and why it includes crimes that does not materially benefit them (i.e. why they might commit vandalism or fight).	In this book, Merton outlined his well-known **strain theory** of deviance. His standard functionalist view was that there was a value consensus: through socialisation we all share the same norms, values and life goals. With that in mind, he set out to try and explain why some people committed crimes, apparently seeming to deviate from the norms and values of society. He looked to develop the ideas of Durkheim and apply them to American society. Merton argued that people were encouraged to believe in the American Dream: that is that, through hard work, everyone can have a comfortable life with their own home and access to consumer goods. However, Merton noted that, in reality, achieving this was much easier for some people than others. In other words, there was a **strain** between what people wanted in life and the socially-acceptable way of getting it (hard work, qualifications, etc.). Merton argued that some people could respond to that strain by committing crimes.	This feminist study, based on interviews with 39 women, looks at why some women commit crimes. Carlen concluded working- class women made a **class deal** and a **gender deal** that generally kept them under control. The class deal was that they would work hard in exchange for pay which they could use to pay for goods. The gender deal was that they do domestic labour and give love and companionship to their husbands, in exchange for love and financial support. Both these deals keep working-class women **respectable**. Carlen suggested, that when these deals broke down working-class women were more likely to commit crimes, as a rational choice. For Carlen both "deals" were exploitative - women were exploited in families, and the working class was exploited by employers in the capitalist system (agreeing with Marxists). However, there was an illusion of fairness and respectability about these deals that, most of the time, kept women under control.	Feminist Frances Heidensohn outlined an argument for why women are less likely to commit crime than men. Heidensohn seeks to explain it in terms of the way girls and women are controlled by men, leaving them with fewer opportunities to commit crime. This is known as **control theory**. According to Heidensohn, girls are controlled by fathers and male siblings. She also said that there was more informal control of girls than boys in society. Heidensohn argued that this control, by family members and social expectations, continues for women in adulthood. They go from being controlled by fathers to being controlled by husbands. As such, Heidensohn suggests that it is patriarchy which accounts for women committing fewer crimes than men. Some suggest that this is an outdated picture. Freda Adler suggests that women today have much more freedom (and suggests that is why female crime is now increasing.)	Becker's classic study in which he introduced his **labelling theory** and the quote: **"deviant behaviour is behaviour people so label".** Howard Becker was an interactionist. He was interested in the idea of deviance, not so much as a social problem that needed to be solved, but as an idea: how people chose to see other people and how they chose to see themselves. The heart of labelling theory is quite simple: what makes an action deviant is the fact that other people say it is deviant. For Becker, the interesting thing was not the deviant act itself but the reaction to it. It is the agents of social control who have the ability to make a label stick. Once someone has been labelled as a deviant, it could become their **master status** - the way they see themselves - and this can lead to a **self-fulfilling prophecy** where people end up living up to their label, starting a **deviant career** and ending up part of a deviant **subculture**.

YEAR 10 CYCLE 2 STATISTICS

Statistics, Yr 10 Cycle 2 & 3
Formulae you need to know for the exam

Sampling

$$\textbf{Stratified sample} = \frac{strata}{total} \times sample\ size$$

Capture-Recapture:

$$\frac{First\ Capture}{Total\ (N)} = \frac{Tagged}{Second\ capture}$$

Representing Data

Angle in a Pie Chart:

$$\frac{Class\ frequency}{Total\ frequency} \times 360$$

Comparative Pie Chart:

$$\frac{r_1}{r_2} = \sqrt{\frac{F_1}{F_2}} \qquad r_1 = r_2 \times \sqrt{\frac{F_1}{F_2}}$$

$r = radius \quad F = Frequency$

Histograms: $\textbf{Area} = \textbf{Frequency}$

$$\textbf{Frequency Density} = \frac{Frequency}{Class\ Width}$$

$$\textbf{Frequency} = Frequncy\ Density \times Class\ Width$$

Averages

$\textbf{Mode} = most\ common$
$\textbf{Modal class} = Class\ with\ highest\ frequency$

$$\textbf{Median (discrete data)} = \frac{n+1}{2}th\ value$$
$$\textbf{Median (grouped data)} = \frac{n}{2}th\ value$$

$\textbf{Mean}, \bar{x}\ \textbf{(discrete data)}$

$$\bar{x} = \frac{\sum x}{n}$$

$\textbf{Mean}, \bar{x}\ (\textbf{frequency table})$

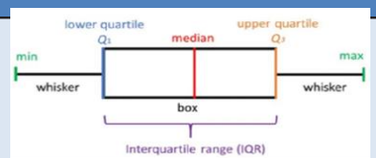
$$\bar{x} = \frac{\sum fx}{\sum f}$$

When data is grouped use the midpoints.

$$\textbf{Weighted Mean} = \frac{\sum(weight \times value)}{\sum weights}$$

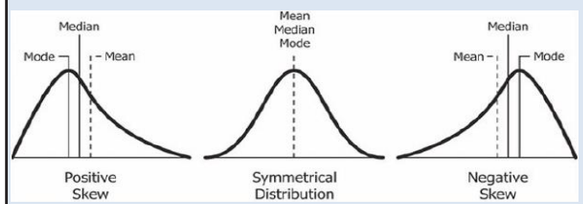
$$\textbf{Geometric Mean} = \sqrt[n]{x_1 \times x_2 \times x_3 \times \cdots \times x_n}$$

Box Plots



Outliers

$$values > UQ + (1.5 \times IQR)$$
$$values < LQ - (1.5 \times IQR)$$



Measures of Dispersion

$$\textbf{Range} = largest\ value - smallest\ value$$

$\textbf{Interquartile Range}\ (\textbf{IQR})$:
$Upper\ Quartile\ (UQ) - Lower\ Quartile\ (LQ)$

$$\textbf{Decile} = \frac{n+1}{10}th\ value$$
$$\textbf{Percentile} = \frac{n+1}{100}th\ value$$

Interdecile Range is the difference between 2 deciles
Interpercentile Range is the difference between 2 percentiles.

$\textbf{Standard Deviation}, \sigma$

The formulae for discrete data are given in exams

Discrete data:

$$\sigma = \sqrt{\frac{1}{n}\sum(x-\bar{x})^2} \quad \text{or} \quad \sigma = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2}$$

Mean of the squares minus square of the mean

Frequency Table or Grouped Data:

$$\sigma = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

When data is grouped use the midpoints.

Foundation Tier Formulae

Higher Tier Formulae

YEAR 10 CYCLE 2 STATISTICS

Time Series

Moving averages
Calculate mean of values

Seasonal Variation
$Actual\ value - Trend\ value$

Estimated Mean Seasonal Variation
Mean of all the seasonal variations for that season

Predicted Value
$Trend\ Line\ Value\ (from\ graph) + EMSV$

Scatter Diagrams

***Mean Point*, $(\bar{x}, \bar{y})$**
$(Mean\ of\ x\ values, Mean\ of\ y\ values)$

Equation of Line of Best Fit
$y = ax + b$

***Gradient*, a**
$$a = \frac{y_2 - y_1}{x_2 - x_1}$$

Spearman's Rank Correlation Coefficient (SRCC)

$$SRCC, r_s = 1 - \frac{6\sum d^2}{n(n^2 - 1)}$$

This formula is given in the exam

$d = difference\ between\ ranks$
$n = number\ of\ values$

Foundation Tier Formulae

Higher Tier Formulae

Index Numbers

$$\textbf{\textit{Index Number}} = \frac{Price}{Base\ year\ price} \times 100$$

Weighted Index Number
$$\frac{\sum(index\ number \times weight)}{\sum weights} \times 100$$

Chain Base Index Numbers
$$\frac{Price}{Last\ year's\ price} \times 100$$

Rates of Change

$$\textbf{\textit{Crude Rate}} = \frac{Number\ of\ births/deaths}{Total\ population} \times 1000$$

Standard Population
$$\frac{Number\ in\ age\ group}{Total\ population} \times 1000$$

$$\textbf{\textit{Standardised Rate}} = \frac{Crude\ rate}{1000} \times standard\ pop$$

Probability Distributions

Normal Distribution
- Data is continuous
- Distribution is symmetrical
- Mode, median and mean are all approximately equal

Binomial Distribution
- Fixed number of trials (n)
- Each trial has 2 outcomes, success (p) or failure
- All the trials are independent of each other
- Probability of success is constant

$$\textbf{\textit{Standardised Score}} = \frac{Score - Mean}{Standard\ Deviation}$$

Probability

$$\textbf{\textit{P(event)}} = \frac{Number\ of\ successful\ outcomes}{Total\ number\ of\ outcomes}$$

Expected Frequency of Event A
$P(A) \times number\ of\ trials$

Estimated Probability
$$\frac{Number\ of\ trials\ with\ successful\ otcomes}{Total\ number\ of\ trials}$$

Risk
$$\frac{Number\ of\ trials\ in\ which\ event\ happens}{Total\ number\ of\ trials}$$

Relative risk
$$\frac{Risk\ for\ those\ in\ the\ group}{Risk\ for\ those\ not\ in\ the\ group}$$

Mutually Exclusive Events
$\boldsymbol{P(A\ or\ B)} = P(A) + P(B)$

Mutually Exclusive Exhaustive Events
$(PA) + P(not\ A) = 1$

General Addition Law
$\boldsymbol{P(A\ or\ B)} = P(A) + P(B) - P(A\ and\ B)$
$\boldsymbol{P(A \cup B)} = P(A) + P(B) - P(A \cap B)$

Independent Events
$\boldsymbol{P(A\ and\ B)} = P(A) \times P(B)$
$\boldsymbol{P(at\ least\ 1)} = 1 - P(none)$

Conditional Probability
$$\boldsymbol{P(B|A)} = \frac{P(A\ and\ B)}{P(A)}$$