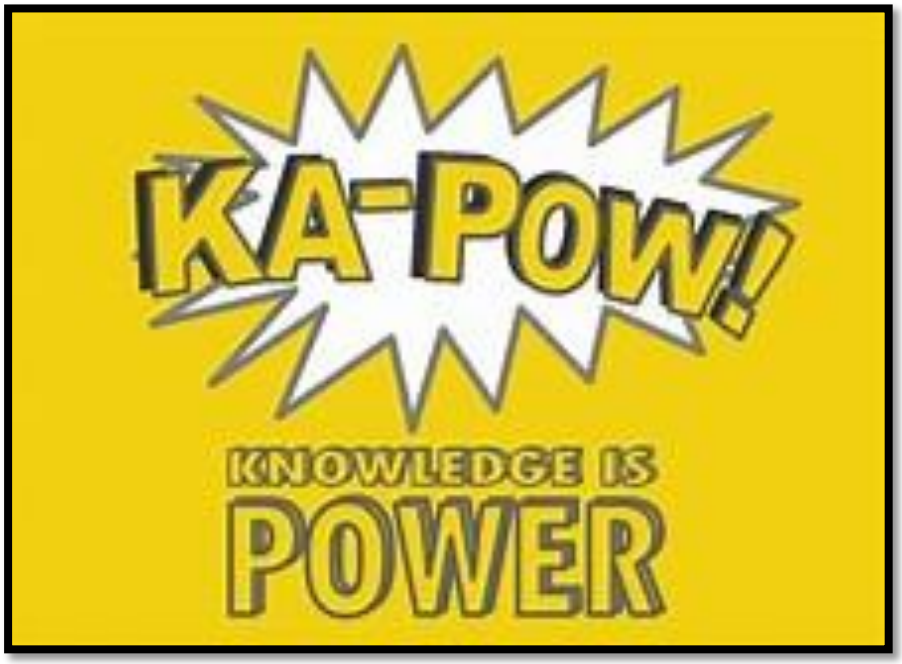
Year 9

Knowledge Organiser

Half Term 1



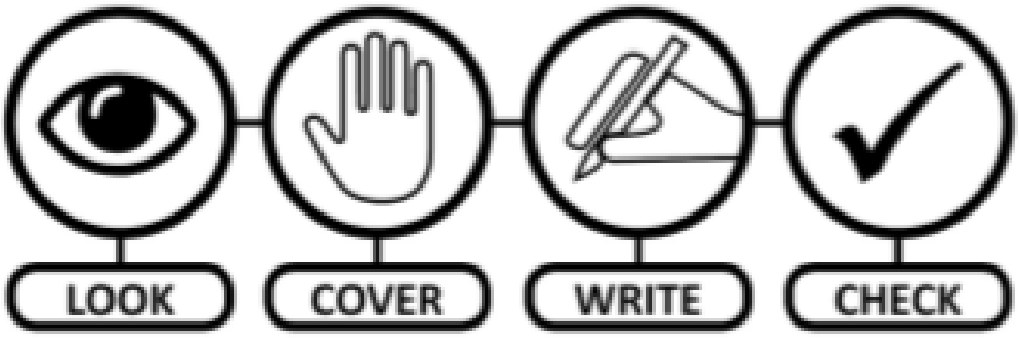
Name

Self-Quizzing Book

Knowledge organisers contain **critical** knowledge you must know. They will help **you remember more** and learn complex information and concepts. Using knowledge organisers will make you more successful in your subjects.

You need to bring your knowledge organiser booklet and self-quizzing book with you **every day**.

For homework you will be asked to self-quiz using your knowledge organisers. You will do this in this book using look, cover, write, check.



Look: Spend a small amount of time reading a section of the knowledge organiser and trying to memorise the content.

Cover: Cover up that section of your knowledge organiser.

Write: In your self-quizzing book, write out the information you have tried to memorise from the knowledge organiser.

Check: Uncover the section of your knowledge organiser and check every word, including spellings. Make any corrections using a **green pen**. If it is all correct, tick what has been written.

Repeat this process until **one whole page** of your self-quizzing book is full, with **no whole lines left empty**.

Respect **Resilience** **Responsibility**

Expectations

You should be proud of the work you produce and how hard you have worked.

There should be no wasted space on each page.

No whole lines should be left empty.

Corrections should be made in a **green pen**.

Example

Subject, underlined

Date in full, underlined

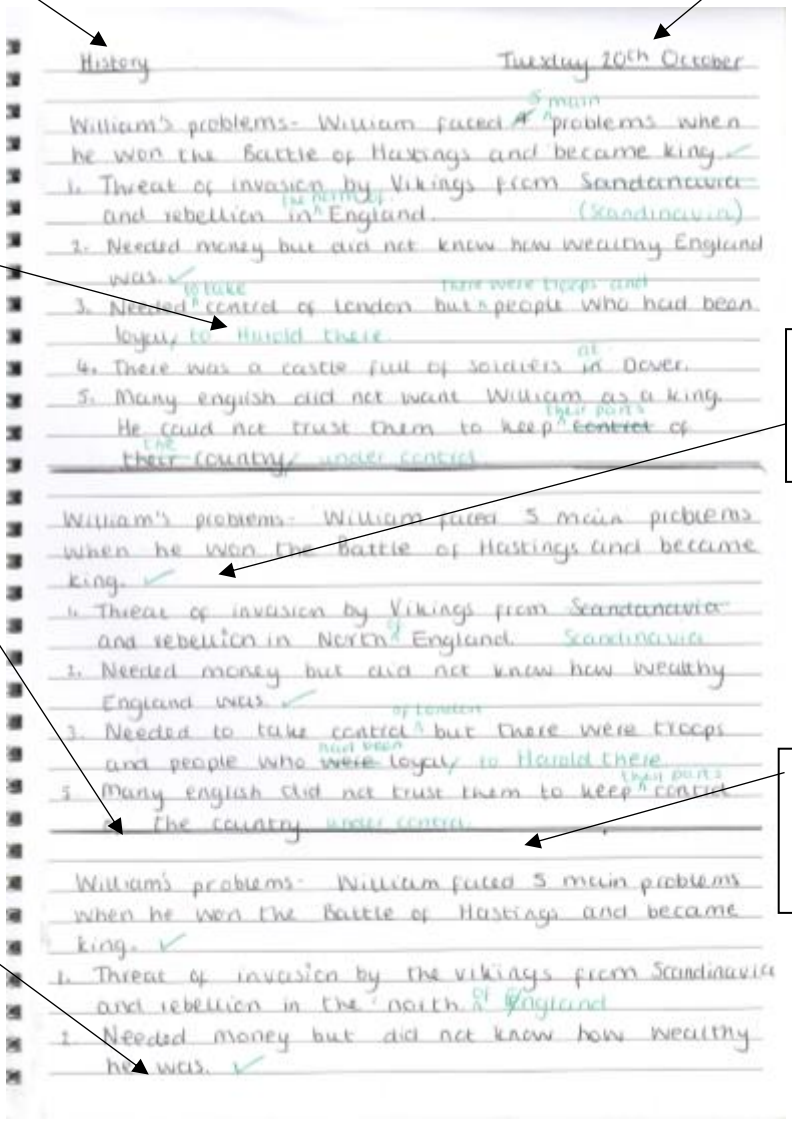
Corrections made in green pen.

Each line checked and ticked if correct.

Solid black line after each attempt

No whole lines left empty except between repeats.

Repeat until the whole page is full



History — Tuesday 20th October

William's problems- William faced 5 main problems when he won the Battle of Hastings and became king.
1. Threat of invasion by Vikings from Scandinavia and rebellion in the North of England.
2. Needed money but did not know how wealthy England was.
3. Needed to take control of London but there were troops and people who had been loyal to Harold there.
4. There was a castle full of soldiers at Dover.
5. Many english did not want William as a king. He could not trust them to keep their ~~control~~ of the county under control.

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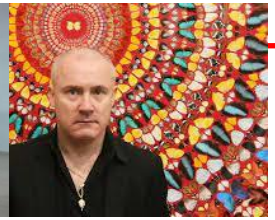
Respect **Resilience** **Responsibility**

LAND, SEA & AIR

YR9 ART

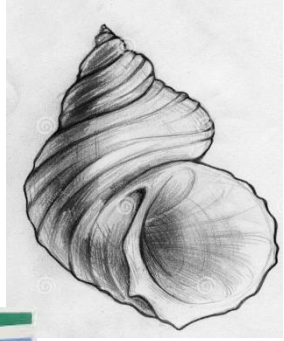


Damien Hirst is a famous British artist, most notable for his work featuring a shark in three sections and preserved in formaldehyde. He also used real butterflies in his work, sticking them in a radial pattern.

Greta Thunberg is a Swedish activist and a very inspiring young person. She bravely speaks out about climate change and how companies can be more friendly to the environment.

Typography means letters. These can come in different fonts and styles. Sometimes a font can tell you a lot about the meaning of the work. Some fonts are scary, formal, silly, fast, curvy, blocky etc…

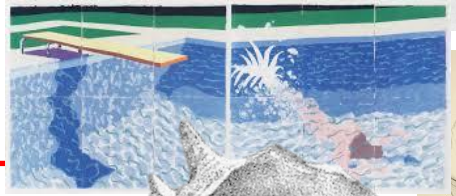
Maggi Hamblin put the emotions she was feeling into her artwork. Turmoil in her life fed into the work she produced, often creating huge canvases of waves that symbolised the turbulence she felt. She used large brushes, palette knives and acrylic paint.

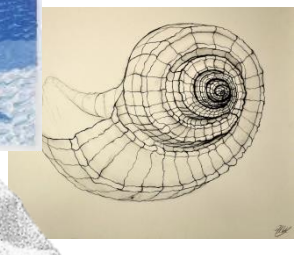


Shells and other sea life provide wonderful drawing subjects. Fascinating shapes, lines and forms are abundant.

Oil Pastel is a colourful and messy material that blends exceptionally well. Using a transfer method, marks can be applied and detail can also be used to draw fur/feather/scales in intense colour!

David Hockney was a master of making marks and using exciting materials to symbolise water

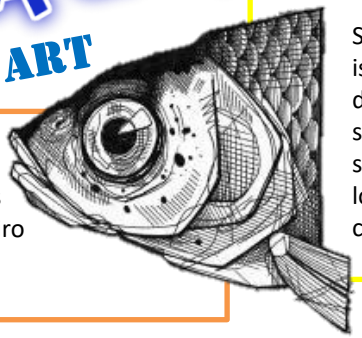




CHRISTINA MASSEY is a modern artist who focuses on weaving materials. A weave is where material is interlaced and weaved in and out of one another. Also known as warp and weft.

Marbling is the art of creating colourful patterns by dipping paper into an oily tray of colour pigments. Thus transforming pattern to paper.

The 'Polluted Water Popsicles' project was created by three students of the National Taiwan University of Arts



LEA NAHON is a tattoo artist who works in line drawing. She adds shading through hatching and cross hatching. She uses Indian ink and biro pen to create an illustrative design before tattooing it onto skin.

Sgraffito (scratched) is a form of decoration made by scratching through a surface, to reveal a lower layer of a contrasting colour.

Year 9- Design and technology

Make sure you memorise ACCESSFM, and use this to analyse 3 products in your Kitchen.

Design Strategies

You can use design strategies to come up with initial design ideas without getting you on a bad one. Designing is a really complex process and there are several different ways of doing it:

User-Centred design: The wants and needs of the client are prioritised- their thoughts are given a lot of attention at every stage of design and manufacture

When you are designing a product it is easy to get stuck on a particular idea. This is called design fixation and it can stop you thinking creatively and coming up with innovative ideas.

Following the design strategy can help you avoid design fixation and encourage you to look at your design in a critical way to make improvements. Other ways to avoid are-

- Collaboration
- Honest feedback
- Focusing on new solutions
- Using fresh approaches

You can also annotate your designs to fully explain further using ACCESSFM

A= Aesthetics
C= Cost
C= Customer
E= Environment
S= Size
S= Safety
F= Function
M= Materials

Find an existing design and use this formula ACCESS FM to analyse your products.

Cross curriculum topics

Science

- Structure of polymers
- How long does it take for plastic to degrade?

Geography

- Impact of pollution on the wider world.
- How has the geography landscape changed with the rise in pollution?

Maths

- Sizing and tolerances of products
- Use of time within a practical task

English

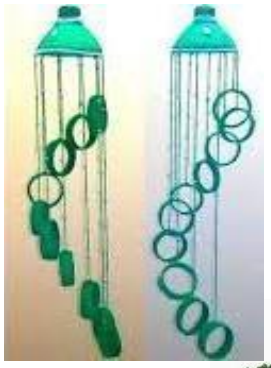
- Justification of practical choices, evaluation techniques and improvement comments

History

- What materials were used before plastics? How in history have other countries dealt with pollution?

PSHE

- Creation of sensory items for the health hub and sensory garden at OSSMA












Drama
Year 9
Performing Arts

Costume design

Costume is an important aspect of a production, as it helps to: establish a character, convey the context of the play and support the style of the production. Other aspects to consider when designing a costume include: accessories, hair and make-up, practicalities, shape and texture. Colour is a very important aspect as it can convey as symbolic idea or reveal something about the character.

Vocal skills

Accent: Accent refers to a particular way of talking and pronouncing words, and is associated with a geographical area or social class.
Volume: Volume refers to how loud or quiet the voice is. While performers will need to be loud enough to be heard by everyone in the audience, they can change their volume to express a character's emotions.
Tone: Tone is the emotional sound of the voice, eg frightened, angry or joyful, and is very important in revealing the subtext of a line.
Emphasis: Emphasis is where a performer will stress a particular word or phrase within a sentence to indicate importance.
Pace: Pace is the speed at which lines are delivered. The speed of speech can often convey how someone is feeling.
Rhythm: Rhythm is related to pace, and refers to the pattern of sound when speaking.
Pause: A pause (or beat) is a short break in speech for dramatic effect. A performer may choose to pause to show hesitation, that they are overwhelmed with emotion, or that they are thinking.
Pitch: Pitch is how high or low the voice sounds
Quality: Quality refers to the basic sound of the voice and is largely influenced by how sound moves through the vocal folds.
Resonance: Resonance refers to the placement of the voice and where the sound resonates, eg in the chest, throat or nose.

Lighting design

One of the most important functions of lighting design is illuminating the action on stage. Lighting is needed so that the audience can see clearly what is happening.

Lighting can help to create mood and atmosphere on stage. For example, to create a cold, damp jail cell, a lighting designer might use a cool, blue light with a low intensity.
When designing lighting, there are several aspects to consider, including: colour, focus, intensity, position and direction.

Stage design

The set helps show where and when the story of a play takes place, while also conveying meaning to the audience.
When designing a set, there are several aspects to consider, including: colour, condition, practicalities and scale. Designers will also consider: shape, staging configuration, texture, transition and health and safety.

Projections are becoming more common within set design and can be used to add detail and texture on stage.
A flat is a piece of scenery used to represent a wall or to conceal a backstage area.
Revolves are sometimes uses which is a turntable built into the stage floor on which scenery can be set and turned.

Physical skills

Body language: Body language includes posture and stance and can convey a character's feelings or personality.
Eye contact: Eye contact is the state in which two people look directly into one another's eyes. It can be used to reveal the status and relationship between characters.
Facial expressions: Facial expressions are the way the face moves to convey an emotional state.
Gait: Gait is a person's manner of walking. The way a performer walks on stage will form part of their characterisation.
Gesture: Gesture is the way people communicate with their hands or other parts of the body. It can be used to show a character's emotions, eg shaking a fist to represent anger.
Pace: Pace is the speed of a performer's movement. As well as focusing on pace individually, the pace of movement within a scene can completely change the atmosphere on stage.
Space: Space refers to how performers or items are positioned on stage. The process of placing performers in a specific space is called blocking.
Levels: Levels refer to the use of different heights, eg through standing or sitting, to convey meaning on stage. They can be used to create visual interest but they can also signal status and character relationships.


Year 9 – Of Mice and Men


Key Vocabulary:	*Definition:*
Migrant (noun)	A person who moves from one place to another, especially in order to find work or better living conditions.
Microcosm (noun)	A community, place or situation which encapsulates the characteristics of something much larger.
Segregation (noun)	The action or state of setting someone apart from others.
Isolate (verb)	To be alone or apart from others.
Pugnacious (adj.)	To be eager or quick to argue/ fight.
Derogatory (adj.)	Showing a critical or disrespectful attitude.
Hierarchy (noun)	A system in which members of an organisation/ society are ranked according to status or authority.
The American Dream	The national ethos of the US which states every man has a right to freedom, prosperity and success.
Hostility (noun)	Behaviour which shows feelings of dislike, unfriendliness or opposition.
Subject Terminology:	***Definition:***
Cyclical Structure	When the ending of a text has similarities with the beginning.
Foreshadowing	When a writer gives hints/ warnings of events which will happen later in the story.
Motif	An idea, object, or concept that repeats itself throughout a text.
Contrast	Differences between two places, people, objects, ideas.
Natural Imagery	A set of images depicting the world of nature.
Metaphor	A comparison between two things, made by directly relating one thing to another unrelated thing.
Simile	A comparison showing similarities between two different things. A simile draws resemblance with the words "like" or "as."
Colloquial language	The use of informal or everyday language.

Key themes:

Friendship and loyalty – George and Lennie are the most obvious example of this theme, however we see a sense of camaraderie from many of the ranch hands, including Slim and Candy.

Hostility and brutality – All of the men on the ranch are suspicious of each other. George, Crooks and Candy are all mistrusting of others. Whilst characters like Curley and Carlson are quick to join in on witch hunts when the opportunity arises. Steinbeck emphasises the negative impact this mistrust can have.

Isolation and loneliness – Every character in this novel feels loneliness at some point. Many of the characters are segregated because of their differences (disability, gender, race). Steinbeck highlights how difficult life was for Migrant workers through this theme.

The American Dream – George and Lennie, again, are probably the most obvious example because of their aim to 'live off the fatta the land'. However, Candy, Crooks and Curley's wife all long for the American Dream. In this novel, it seems unobtainable.

Characters:

George – Lennie's closest friend, George is protective of Lennie and loyal towards him, claiming Lennie stops him from getting mean. However, George can sometimes lack patience with Lennie's optimism.

Lennie – Naïve, immensely strong and gentle, Lennie has a mental disability that means he is solely reliant upon George. As a result, Lennie is the focus of Curley's cruelty.

Candy – The oldest worker, Candy is a one handed handyman with a feeble dog. Candy is desperate to believe in a dream or plan. He offers to help George and Lennie by cashing in his life savings to help them buy a farm.

Slim: self assured and respected, Slim is the calm, quiet authority of the men at the ranch. He understands George and Lennie's friendship.

Curley – An insecure, violent man who actively looks for violence or opportunities to prove his worth. Incredibly possessive of his wife, Curley seems to pick fights to compensate for his lack of size.

Curley's Wife – Flirtatious and lonely, Curley's wife is presented a s a danger to the other men because of Curley's jealousy. She shares her lost dreams with Lennie.

Crooks – Cynical but wants to believe in the American Dream. He is only black migrant worker on the farm. As a result of this he sleeps in the stables, segregated from the other men.

Plot summary:

Two laborours (George and Lennie) start work at a ranch, having fled their previous jobs after Lennie was accused of attempted rape. George and Lennie both dream of saving enough money to buy their own ranch. Curley instantly takes a dislike to Lennie and tries to fight him, resulting in disaster for Curley. Lennie is given a puppy by Slim as he likes to stroke soft things. Unfortunately, this leads to a tragedy when Lennie is left alone with Curley's wife. George is then faced with an impossible decision when a lynch mob go after Lennie.

Context:

John Steinbeck often wrote books which could be class as "social novels dealing with the economic problems of rural labour." He was asked by the editor of the San Francisco New to write a series of articles on farmers who migrated to California from the Southwest dustbowl. He was horrified by the conditions these men were living and working in. Of Mice and Men highlights the struggles of many migrant workers and also emphasizes the importance of friendship.

The Great Depression took place following the Wall Street Crash in October 1929 (known as Black Thursday) which affected the world's economy. It was the worst economic collapse in the history of the modern world. The depression led to a drop in the market price of farm crops, meaning that farmers had to produce more to earn the same amount of money. This increase of farming activity (Along with numerous droughts across the country) meant that many areas in the Southwest became known as the Dust bowl because of their likeness to a desert region. Many people heard that land in California was still fertile so moved their entire lives across the country.

The American Dream is written into the *Declaration of Independence*: "life, liberty, and the pursuit of happiness." *Of Mice and Men* shows that for poor migrant workers during the Depression, the American Dream became an illusion and a trap through characters such as Crooks and Curley's wife (who are subject to discrimination) and the ranch hands who can't hope to escape their dreary lives.

Spanish Knowledge Organiser
Year 9 - Autumn 1

This year you will be learning sentences which use the 10 keys. For this first half term we would like to show you some of those key words that we want to see you continuing to use all year.

Week 1&2

Connectives

- **pero** - but
- **y** - and
- **sin embargo** - however
- **sobre todo** - especially
- **tambien** - also

Qualifiers

- **muy** - very
- **un poco** - a little
- **bastante** - quite
- **demasiado** - too

Week 3&4

Opinions

- **Pienso que** - I think that
- **Creo que** - I believe that
- **Desde mi punto de vista** - From my point of view

Comparatives

- **más + adjective + que** - more + adjective + than
- **menos + adjective + que** - less + adjective + than

Superlatives

- **el/la más + adjective** - the most
- **el/la menos + adjective** - the least

Week 5&6

Time phrases

- **El fin de semana pasado** - last weekend
- **El fin de semana próximo** - Next weekend
- **Todos los fines de semana** - every weekend
- **A veces** - sometimes

Modal verbs

- **Tengo que** - I have to
- **Puedo** - I can
- **Quiero** - I want

French Knowledge Organiser
Year 9 - Autumn 1

Week 1&2

Connectives

- **mais** - but
- **car** - becuase
- **cependent** - however
- **surtout** - especially
- **aussi** - also

Qualifiers

- **très** - very
- **un peu** - a little
- **assez** - quite
- **vraiment** - very
- **trop** - too

This year you will be learning sentences which use the 10 keys. For this first half term we would like to show you some of those key words that we want to see you continuing to use all year.

Week 3&4

Opinions

- **Je pense que** - I think that
- **Je crois que** - I believe that
- **À mon avis -** from my point of view

Comparatives

- **plus + adjective + que** - more +adjective + than
- **moins + adjective + que** - less + adjective + than

Superlatives

- **Le plus** - the most
- **Le moins** - the least

Week 5&6

Time phrases

- **Le week-end dernier** - last weekend
- **le week-end prochain** - next weekend
- **tous les week-ends** - every weekend
- **parfois** - sometimes

Negatives

- **ne ... plus** - no longer
- **ne...jamais** - never
- **ne...pas** - not

Modal verbs

- **je veux** - I want
- **je dois** - I must
- **je peux** - I can

Year 9 Food Knowledge Organiser: Principles of Nutrition

Macronutrients
Needed in **large amounts** to help the body to function properly

Protein:

These are made up of ***essential amino–acids*** and ***non-essential amino–acids***. (Our bodies can make non-essential amino acids, but we need to get essential amino acids from our food).

Source

HBV – these have all the essential amino acids
•Meat, fish, dairy, eggs (animal sources)
•Tofu
LBV – these are missing at least one essential amino acid
•Seeds, nuts, beans, pulses, cereals, Quorn (plant sources)

Function

Growth
Repair
maintenance

Not enough	Too much
Kwashiorkor Oedema Anaemia Slow growth in children	Excess protein can be converted to energy. If unused turns to fat.

Dietary Reference Values

Age	Amount
1-3	15g
4-6	20g
7-10	28g
11-14	42g
15-18	55g
19-50	55g
50+	53g

Complementary actions

Combining 2 or more LBV proteins helps get a balance of essential amino acids.
e.g. beans on toast.

Watch this video to learn more

https://www.youtube.com/watch?v=cKRf53I737E

Fats, oils and lipids:

Too much fat is bad for you, but so is not enough.

Source

Saturated Fats
(From Animal sources. They are also called unhealthy fats. They are generally solid at room temperature)
Sausages / Bacon / Lard / Dairy

Unsaturated Fats
(These are healthier. They are often liquid at room temperature.)
Monounsaturated fats
– olive oil / avocados
Polyunsaturated fats
– sunflower oil / seeds

Omega-3. These are Polyunsaturated and called "healthy" fats as your body needs them but can't make them. They are good for your heart.
– Oily fish / Nuts / Seeds

Function

Energy
Warmth
Protection of organs
Source of fat soluble vitamins
Hormone production

Dietary Reference Values

DRI	Men	Women
Total fat	95g	70g
Sat fat	30g	20g

Too much	Not enough
Obesity **Heart disease** **Type 2 diabetes** **Stroke** **Cancer**	Vitamin deficiency (fat soluble) Unprotected organs

Carbohydrates

There are 2 kinds, simple and complex - Sugar & Starches

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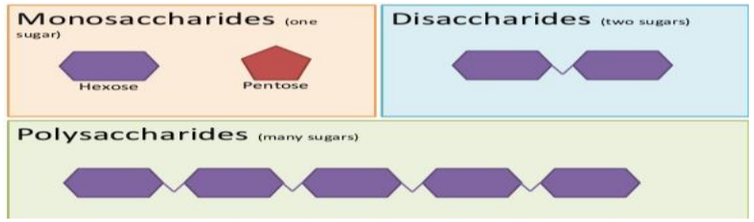


Source

Simple - these are sugars (monosaccharides, disaccharides)
Cakes, jam, soft drinks

Complex - these are starches (polysaccharides)
Bread, potatoes, Flour, Pasta,Rice.

Function

Simple
Quick burst of energy
Complex

Longer lasting energy

Free sugars

These give you no nutritional benefit other than energy.

Dietary advice

- Reduce the amount of sugar that we eat, no more than 5% of our diet.
- Complex Carbohydrates should make up half of the energy we eat.
- Wholegrain cereals are a good source of fibre

Not enough	Too much
Can make blood sugar level drop • hunger, • dizziness, • Tiredness • Lack of energy Our body will use protein for energy (leads to loss of muscle)	• Excess is turned into fat • Can cause obesity • Too much sugar leads to dental problems • Can lead to type 2 diabetes

Year 9 Food Knowledge Organiser: Dietary needs

Dietary Needs

People have different dietary needs; this affects what they can and cannot eat.

Key Words:

- **Allergy:** an adverse reaction by the body to certain substances.
- **Intolerance:** a condition that makes people avoid certain food because of the effects on their body
- **Allergic reaction:** the way someone responds to certain food. For example: a rash/swelling/anaphylactic shock

Some people make a choice not to eat certain foods. Reasons include:

- Religious beliefs

- Medical reasons

- Taste/texture of food

- Ethical beliefs

Vegetarians

There are many different types of vegetarian depending on which animal foods are included in the diet.
People may follow a vegetarian diet for different reasons

- They do not like the thought of eating dead animals, fish, birds
- They think it is cruel to kill for food
- Their religion does not allow them to eat meat, fish, poultry.
- They think it is healthier to eat a vegetarian diet.

The three main types of vegetarian are lacto-vegetarian, lacto-ovo vegetarian and vegan.

lacto-vegetarian –will not eat any meat, fish or eggs, but will consume milk and dairy products.
lacto-ovo vegetarian –will not eat any meat, or fish , but will consume eggs, milk and dairy products.
Vegan – will not eat any food that is made directly or indirectly from an animal. They also refuse to use product such as soap and cosmetics which involve the use of animal oils or fats.

Diet Related Health Problems

Obesity - When the body has too much fat.

- BMI (Body Mass Index) is used to calculate body mass

BMI of 18.5 – 25 is normal, 30 + is obese.

Cause: energy in > energy out; Eating too many high energy foods (fat & sugar); Low exercise levels.

Problems: High blood pressure and cholesterol = heart problems; Increased risk of type 2 diabetes & cancer

Breathing difficulties, fatigue & low self esteem.

Coronary Heart Disease Arteries clogged with cholesterol

- Cause: saturated fats, low physical activity, smoking & high blood pressure.
- Health Problems: Blood cannot pass through arteries properly which causes heart to pump faster and harder, causing chest pains (angina);blood flow and oxygen to the heart gets blocked which causes heart attacks

Tooth Decay

Plaque is a substance which contains bacteria. This builds up from food in the mouth. Bacteria feed on sugars and form acids which eat away at tooth enamel and cause tooth decay (caries/cavities) Cause: high sugar foods.

Religious Reasons

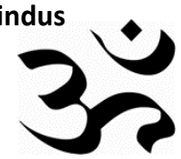
Islam

- **Do not eat pork**
- **Meat must be halal**
- **No alcohol or shellfish**

Judaism

- **No pork or shellfish**
- **No milk and meat together**
- **Meat must be kosher**

Hindus



- **No beef or beef products**
- **Mostly vegetarians**
- **No alcohol**

Medical reasons

Name of medical condition	Food/drinks to avoid	Reason to avoid
Diabetes	Starchy food/ high in sugar	High in saturated fat. Can lead to heart disease, while excess sugars can cause unwanted weight gain and blood sugar spikes
Nut allergy	Nuts, blended cooking oil, margarine with nuts oils and often seeds	the immune system overreacts to proteins in these foods
Lactose intolerance	Milk, cheese, yogurt, processed food	cannot metabolize **lactose** properly; they lack lactase, an enzyme required in the digestive system to break down **lactose**. Patients typically experience bloating, flatulence, and diarrhoea
Gluten intolerance (coeliac)	Wheat, wholemeal, bran, pasta, rye, beer	Celiac disease is caused by a reaction to a gluten protein found in wheat, barley, rye, and sometimes oats. Symptoms include chronic diarrhoea, weight loss and fatigue

YR7 GRAPHICS

The Design Process

Brief

A brief is a set of **instructions** given to a designer by a company (**client**) about a job or task they wish to be completed.

A **company** (client) will ask a **graphic designer** to create a **product**. A product means an item that can be sold to people (**consumers**).

A brief will set out clearly what it is that should be made (**constructed**) and what requirements (**specifics**) will need to be included in the **design process**.

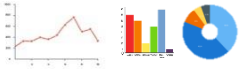
Isometric

When the concept drawing is finished, the design will be turned into an isometric drawing where the size (**dimensions**) of the parts are finalised. Specific measurements (**metric – CM, MM**) are used so that it can copied many times (**mass produced**).

The design will be computerised (**digitally formatted**) so that it can be **saved**, **shared** and **inputted** into the machines that produce it.

Market Research

Companies will employ people to conduct **surveys**. A survey is a set of **questions** that are asked to many people. Often companies would decide which people they will ask (**target audience**). They wish know peoples **preferences** and **spending habits**.



The answers are important to the **design process** and can influence the way the product is **designed**. To make it easy to see large amounts of **data**, companies use **graphs**.

Testing Models

When isometric drawings are complete, it will go through a process of being made **3D**. A number of **machines** will be used to create practice models (**prototypes**) to see how the product works. It must be easy for a human to use (**ergonomics**). **3D printers** are often used.

If the product is made out of different **materials** such as glass, metal or wood, these would require different methods of construction (**manufacturing**).

Design Process

Designers will explore lots of ideas before selecting the right one. Often this involves creating **mind maps**, **sketches** and **mood boards**.

A mind map starts with a single word and then ***explores ideas*** around it, these are sorted into **categories**.

When drawing sketches, designers will work out how it works (**functions**). Ideas at this stage can be really ***creative*** and ***imaginative***.

A mood board is a collections of pictures, drawings, text (**typography**) and **materials** to do with the **theme**.

Packaging

When a final product has been made and passed safety standards, it will be labelled and have its own (**custom**) **packaging**.

Packing must –

- Be eye catching (**visually pleasing**) to attract customers to buy it.
- Protect the item inside it to **avoid damage** or **contamination**.
- Provide **accurate information** about the product inside.
- Stack easily for **transportation** from factory to shops.

Concept Art

Artists/**illustrators** will draw a number of different sketches of the product from different angles.

When designing, **colour** and **style** is important. It is important to think about how it looks (**aesthetics**). Designs will consider the mood board and specifics.

Drawings can be in **traditional** materials (pen, pencil, paint) or using **CAD** (Computer Aided Design) and electric drawing pads (**graphics tablets**).

Advertising

For companies to make money (**financial Income**), they must tell as many people as possible about their product.

This often happens through **social media**, **adverts**, **radio stations**, **magazines** and **displays** in shops.

Its important that the product is well received by its target audience so that people buy it and share reviews of it. Companies make a **profit** when they sell items for more than the price of making it. .

Geography

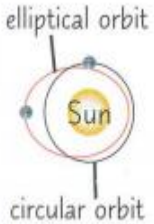
Year 9: Climate Change

- Evidence of climate change
- Natural causes
- Human causes
- Effects
- Management strategies

Three Natural Causes

1. Orbital changes affect how much of the Sun's energy reaches Earth.

MORE ENERGY → MORE WARMING



Wobble of Earth's axis varies.

Stretch — shape of Earth's orbit varies.

Tilt of Earth's axis varies.

2. Volcanic eruptions eject material into atmosphere.
↓
Sun's rays reflected.
↓
Earth's surface cools temporarily.

3. Solar output changes in 11 year cycles.
↓
Reduced energy = cooler areas.

Evidence for Climate Change

CLIMATE CHANGE — any significant change in the Earth's climate over a long period.

During the Quaternary period (the last 2.6 million years), Earth has shifted between glacial periods (cold) and interglacial periods (warmer).

Ice cores	Sediment cores	Tree rings	Pollen analysis	Temperature records
Gases trapped in layers of ice show temperature change.	Remains of organisms in ocean sediments show past conditions.	Thicker rings mean warmer, wetter conditions.	Preserved pollen shows tree types and past climate.	Accurate measurements since 1850s. Historical records extend further back.

Four Human Causes

Global warming is the sharp rise in temp. over the last century.

GREENHOUSE EFFECT — greenhouse gases absorb outgoing heat from the Earth.

Increased greenhouse gas emissions → planet warms

1. **Fossil fuels:** Release CO_2 when burnt.
2. **Cement production:** Turning limestone into cement releases CO_2.
3. **Farming:** Livestock and rice paddies emit methane.
4. **Deforestation:** When trees are cut down, they stop storing CO_2.

Management Strategies

ADAPTATION responds to the effects of climate change.

Changing Agricultural Systems:
- Plant crops suited to changed climates.
- Biotechnology can create drought-resistant crops.

Managing Water Supply:
- Water meters help limit water use.
- Rainwater and waste water collected and recycled.

Coping with Rising Sea Levels:
- Better flood warning systems and flood defences, e.g. Thames Barrier.
- Build houses on embankments, build raised flood shelters.

MITIGATION aims to reduce the causes of climate change.

Alternative energy production: Nuclear or renewable energy sources lower emissions.

Planting trees: More trees = more CO_2 absorbed.

Carbon Capture and Storage: CO_2 emissions from power stations stored securely.

International agreements: Paris Agreement (2016) — countries pledged to reduce greenhouse gas emissions.

Effects of Climate Change

ENVIRONMENTAL

- Glaciers and ice sheets melt → sea level rises.
- Shrinking sea ice → loss of polar habitat.
- Flooding of low-lying, coastal areas → loss of coastal habitats.
- Changing precipitation patterns.
- Species are declining, e.g. coral reefs bleached.

HUMAN

- More deaths due to heat.
- Fewer deaths due to cold.
- People leave uninhabitable areas → overcrowding in other areas.
- Decreased rainfall in some areas → limited water availability.
- Lower crop yields globally → malnutrition, ill health and death.
- High latitude crop yields may increase.
- More extreme weather → management / rebuilding costs rise.

Year 9 History Knowledge organiser Half-term 1: Women in history

Women in science and technology

Marie Curie (born Marie Sklodowska) was born in Poland in 1867. She was fascinated with research on radioactive substances, and discovered two new elements: polonium and radium. Curie also found new uses for X-rays and made strides in the treatment of certain cancers. She was the first person ever to win two Nobel Prizes, one for Chemistry and one for Physics.

Katherine Johnson was born in West Virginia, USA, in 1918. As a black woman in the southern United States, Katherine faced sexist and racist discrimination. She was a talented mathematician who could make complex calculations very quickly, and worked for NASA for 35 years. During this time, she calculated the launch trajectories for the Mercury and Apollo missions, allowing people to go into space and land on the moon.

Hedy Lamarr was born in Austria, and moved to the US in her early 20s as a successful actor. She became a Hollywood star throughout the 1940s. Although she was known to many for her acting and modelling, she was also a great inventor. Among other things, she invented frequency-hopping, a secured radio service that stopped the Nazis listening to Allied radio signals. The technology was later used in Bluetooth and Wi-Fi

Born in 1906 in New York City, **Grace Hopper** earned a PHD in mathematics from Yale in 1934 and joined the US Navy in 1940. She worked in the computer programming division and would go on to lead teams which developed several military-grade computers. Hopper developed the compiler, a device which converts English into machine code. This allowed computers to run different programmes, and laid the foundation for modern computer software.

Women in war

- During the First and Second World War many women took up jobs that were not previously available to them. Many joined factories and manual jobs whilst others joined the army as artillery crews, radio operators and maintenance.
- In World War II all single women aged 19-30 had to register or war work. They worked in the Auxiliary Services, in the Land Army or in industry. Many married women also volunteered and looked after their families as well.
- Over the last decade, many countries, such as Germany, France, Denmark and all across Scandinavia, have allowed women to fight as front-line soldiers. With many more employing women in indirect combat roles such as fighter jet pilots and submarine and battleship crews.

Case Study: Princess Elizabeth

- Queen Elizabeth (then Princess Elizabeth) joined the Women's Auxiliary Territory Service, under the name Elizabeth Windsor. The ATS provided key support during the war, with its members serving as anti-aircraft gunners, radio operators, mechanics and drivers.
- Her family tried to convince her to not join but the Princess resisted and worked as a mechanic. She learned how to deconstruct, repair and rebuild engines and change tyres, and learned how to drive every type of machine she worked on, including jeeps, trucks and ambulances.
- While this may not seem like a huge commitment, this had not been seen before from a member of the royal family. The public rallied to support you young princess in her efforts and many joined similar roles as a result.

Women and politics

The Suffragettes

- The Suffragettes fought for women's voting rights. Some of their methods were very extreme forms of protest, whilst others were peaceful.
- Led by women like Emmeline Pankhurst, the Suffragettes were militant, confrontational, and often violent in their struggles for equality. They attacked politicians and policemen, started fires, and vandalised property. Mary Leigh went to the extent of breaking roof tiles off with an axe and throwing them down on the Prime Minister's car!
- Many Suffragettes were willing to go through severe hardship for their cause. Women went on hunger strikes, were arrested, and even died. Emily Wilding Davison was killed when she was hit by the King's horse during a protest at the 1913 Derby.
- Women gained some rights in 1918, with equal voting rights to men by 1928. Their campaign worked.
- Militancy- the use of confrontational or violent methods in support of a political or social cause.

The Me too movement

- The Me Too movement, is a movement against sexual harassment and sexual abuse where people publicise their allegations of sex crimes committed by powerful and/or prominent men.
- Before the movement took place in 2017, coming forward against powerful people in the business and entertainment world was almost impossible for victims of sexual crimes.
- "Me Too" gave those victims a chance to stand together and from this started a number of history changing court cases. It gave women a chance to see that they were not alone in what happened to them, and that there were other people out there that supported them. Leading to some of the most influential and powerful men in world behind bars.

Year 9 Knowledge Organiser ICT – Functional Skills

Email Key words

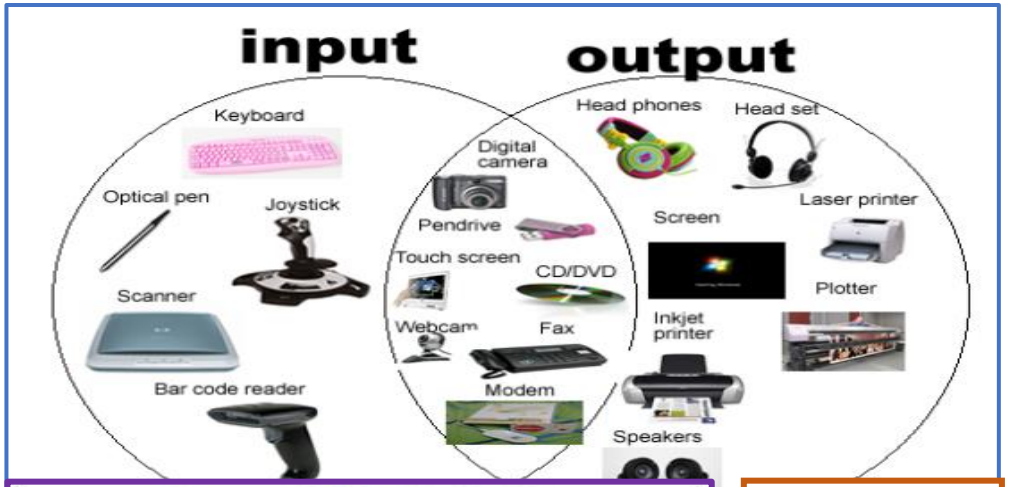
Communication – The sharing or exchanging of information by speaking, writing, or using some other medium such as email.
Email – Messages sent by electronic means from one device to one or more people.
Compose – To write or create something.
Send – To make an email be delivered to the email address it is addressed to.
Attachment – A file, which could be a piece of work or a picture that is sent with the email.
Address book – A list of people who you regularly send an email to.
Save to draft – Allows you to save an email that you are working on and send it later.
Password – A secret word, phrase or combination of letters, numbers and symbols that must be used to gain admission to a site or application such as email.
CC – A way of sending a copy of your email to other people so they can see the information in it.
Formatting – Allows you to change the way the text of an email looks. For example, you can make the text bold or underline it.

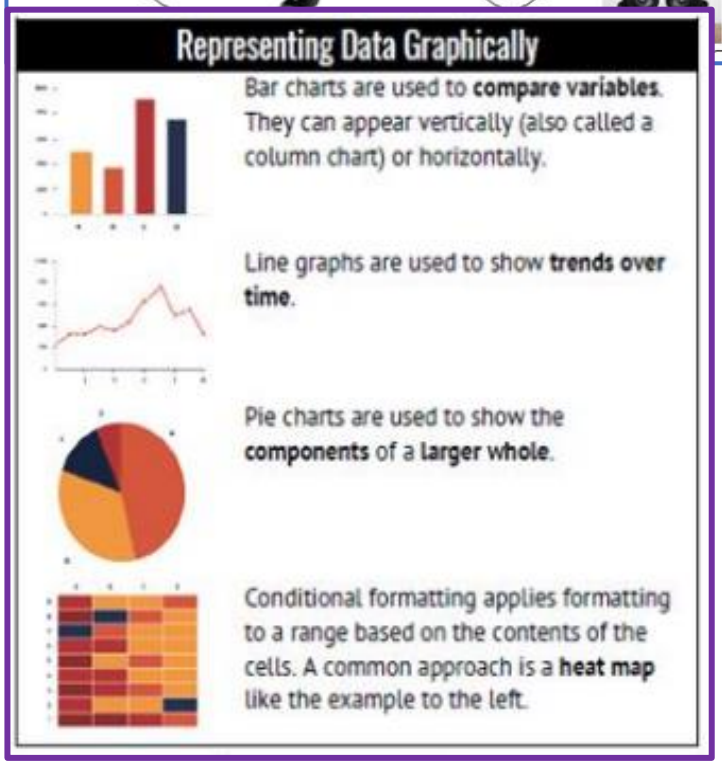
Using the internet safely

Malware - malicious - software intended to cause harm.
Penetration Testing - Organisations employ professionals to try and hack their network so that they can find areas of weakness.
User Access Levels - Different employees have different levels of access to programs, websites and data.
Encryption - data is scrambled so that it cannot be understood if intercepted. It can only be decrypted with a key.
Types of Malware Virus - attach themselves to files and copy themselves when the user copies or opens a file.
Worm - copy themselves without the user doing anything.
Trojan - malicious software pretending to be a legitimate program
Copyright – protects written, music, video, software and images being used without permission

Cloud Storage

Examples are Microsoft One Drive or Google Drive
Stores files online enabling files to be accessed on any device with internet access.
Share files with others and automatic backup





Features of a strong password

A mix of letters, capitals, symbols, numbers
8 or more characters

No dictionary words
No personal information
Consider replacing letters with numbers e.g. the letter E and 3

Year 9 Knowledge Organiser ICT – Functional Skills

Microsoft Office	Word	Excel	PowerPoint	Outlook	Microsoft Teams
Type of program	Word processor	Spreadsheet	Presentation	Email	Chat-based collaboration
Description	Used mainly for creating documents such as letters, brochures, learning activities, tests, quizzes and students' homework assignments. Make changes easily, such as correcting spelling, adding, deleting, formatting and relocating text. Document can be printed quickly and accurately saved for later modifications.	Used to create spreadsheets, which are documents in which data is laid out in rows and columns — like a big table. Helpful and powerful program for data analysis and documentation. Store, organize and manipulate data by creating spreadsheets. Data can be manipulated mathematically using arithmetic operations and functions. Typically used to organize data and perform financial analysis.	Used to create dynamic, informational slides through the use of text, graphics, and animation. Visually display information, using anything from basic slideshows to professional multimedia presentations. Combine text, graphics and multi-media content.	Used mainly to send and receive emails. It can also be used to manage various types of personal data including calendar appointments and similar entries, tasks, contacts, and notes.	Provides a modern conversation experience for today's teams. The core capabilities include business messaging, calling, video meetings and file sharing.
Features	Create documents with different font, styles, sizes, colours. Spelling and grammar check, Thesaurus, Translate, Language preference Insert tables, images, shapes, charts	Use of formulas e.g. sum or average on a large amount of data all at once. Analyse data to discover trends. Graphs and charts can summarize the data and store it in an organized way. Tools for sorting, filtering and searching.	Add text, images, art, and videos. Select a professional design with PowerPoint Designer. Add transitions, animations, and motion.	Send, receive and organise mail. Save and edit contacts lists. Create and manage tasks and alerts. Send and receive meeting invitations. View and manage your calendar.	Conversations within channels and teams. A chat function between teams, groups, or individuals. Document storage and sharing. Online video calling and screen sharing.

Word Processing Key Words

Alignment – the orientation of the lines of a paragraph with respect to the margins.
Editing – making modifications to an existing document.
Font Style– adds emphasis to a font: bold, italic and underline.
Bullet – A dot or symbol that marks an important line of information or designates items in a list.
Vertical Alignment – The position of text in relation to the top and bottom page margins.
Horizontal Alignment – The position of text in relation to the left and right page margins
Autocorrect – A word feature that automatically corrects common spelling errors as you type.
Editing – making modifications to an existing document.
Menu Bar - The menu bar typically appears at the top of the word processing application's window and contains a listing of the main commands in the form of text

Spreadsheet Keywords

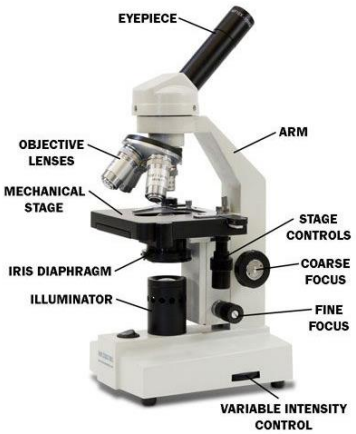
Active Cell - The active cell is the cell in the spreadsheet that is currently selected for data entry.
Cell - A cell is a rectangular area formed by the intersection of a column and a row.
Data - Data refers to the type of information that can be stored in the cells of a spreadsheet.
Formula - A formula is a spreadsheet data type that will calculate a result and display it in the active cell.
Labels - Labels refer to text that is typed into the cells of a spreadsheet.
Range - A range is a group of cells in a spreadsheet that have been selected.
Rows - Rows run horizontally on the spreadsheet screen.
Workbook - A workbook is a collection of worksheets that are saved together in one file.
Column - Columns run vertically on the spreadsheet screen.
Column / Bar Chart: A column or bar chart is a style of chart that is used to summarize and compare categorical data.

B1: Biology key concepts

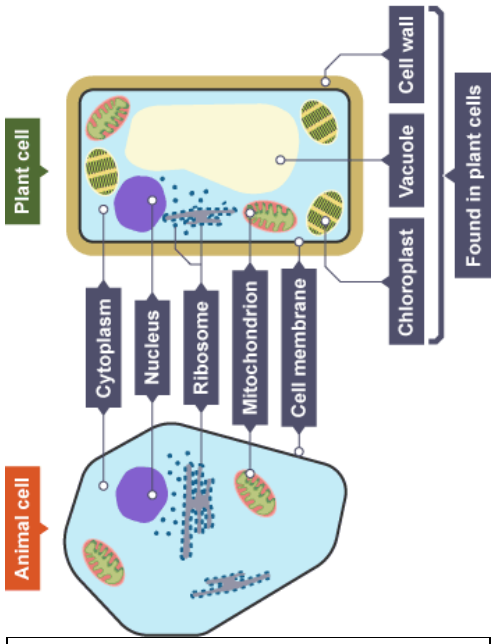
Lesson sequence

1. Microscopes
2. Plant and animal cells
3. Measuring cells
4. Core practical: using microscopes
5. Specialised cells
6. Bacterial cells
7. Digestive enzymes
8. How enzymes work
9. Factors affecting enzymes
10. Core practical: enzymes and pH
11. Cell transport
12. Core practical: osmosis in potatoes

1. Microscopes	
***Magnification**	The number of times bigger something appears under a microscope.
***Eyepiece lens**	The lens on a microscope that you look through.
***Objective lens**	The lens at the bottom of a microscope. There are normally three you can choose from.
***Total magnification**	Eyepiece lens x objective lens.
****Resolution**	The smallest distance between two points so that they can still be seen as two separate points.
****Stains**	Dyes added to microscope slides to show the details more clearly.
****Milli**	Thousandth, $1x10^{-3}$ (a millimetre is a thousandth of a metre).
****Micro**	Millionth, $1x10^{-6}$ (a micrometre is a millionth of a metre).
****Nano**	Billionth, $1x10^{-9}$ (a nanometre is a billionth of a metre).
****Pico**	Trillionth, $1x10^{-12}$ (a picometre is a trillionth of a metre).



2. Plant and animal cells	
***Cell**	The basic structural unit of all living things (the building blocks of life).
***Parts of an animal cell**	Cell membrane, cytoplasm, nucleus, ribosomes, mitochondria.
***Parts of a plant cell**	Cell membrane, cytoplasm, nucleus, ribosomes, mitochondria, cell wall, permanent vacuole, chloroplasts.
***Cell membrane**	Controls what enters and leaves the cell.
***Cytoplasm**	A jelly-like substance where chemical reactions take place.
***Nucleus**	Contains DNA and controls the cell.
***Ribosome**	Produces proteins.
***Mitochondria**	Releases energy by aerobic respiration.
***Cell wall**	Protects and supports the cell, made of cellulose.
***Permanent vacuole**	Stores sap and helps to support the cell.
***Chloroplast**	Where photosynthesis happens, contains chlorophyll.

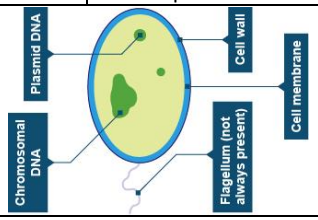


3. Measuring cells	
***Micrograph**	A picture produced by a microscope.
***Light microscope**	A microscope that uses light, can magnify up to 1500 times.
****Electron microscope**	A microscope that uses electrons to produce an image, can magnify up to 1,000,000 times.
****Actual size of a cell**	Actual size = measured size / magnification
****Convert mm to µm**	Micrometres (µm) = millimetres (mm) x 1000

4. Core practical – using microscopes (CP1)	
***CP1 – key question**	What do cells look like under a light microscope?
***CP1 – Prepare the slide**	Collect the cells you are studying and place them on the slide. Add a drop of stain and cover with a cover slip.
***CP1 – Select lens**	Choose between the 4x, 10x and 40x objective lenses.
***CP1 – Place slide in microscope**	Place slide on microscope stage, adjust the coarse focus until the lens is just touching the slide.
***CP1 – Rough focus**	Looking through the eyepiece, slowly adjust the coarse focus until you see a rough image.
***CP1 – Fine focus**	Looking through the eyepiece, slowly adjust the fine focus until you see a sharply focussed image.
***CP1 – Record the image**	Draw what you see, label any cell parts you can recognise and repeat with different objective lenses.
***CP1 - Results**	As you increase the magnification of the objective lens, the cells appear larger and more detailed.

5. Specialised cells	
****Small intestine cell**	**Job:** To absorb small food molecules produced during digestion. **Adaptations:** Tiny folds called microvilli that increase their surface area.
****Sperm cell**	**Job:** Fertilise an egg and deliver male DNA. **Adaptations:** A tail to swim, mitochondria to give energy for swimming, an acrosome to break through the egg's jelly coat, haploid nucleus with only half the total DNA.
****Egg cell**	**Job:** To be fertilised by a sperm and then develop into an embryo. **Adaptations:** Jelly coat to protect the cell, many mitochondria and nutrients to provide energy for growth, haploid nucleus with only half the total DNA.
****Ciliated epithelial cell**	**Job:** To clear mucus out of your lungs (and other internal surfaces). **Adaptations:** Small hairs on the surface – called cilia – which wave to sweep mucus along.

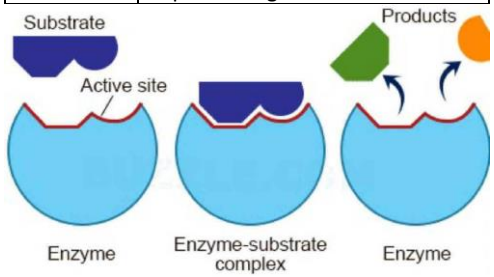
6. Bacterial cells	
***Parts of a bacterial cell**	**All bacteria:** Cell membrane, cell wall, cytoplasm, ribosomes, chromosomal DNA, plasmid DNA **Some bacteria:** flagellum.
****Chromosomal DNA**	Large piece of DNA containing most genes.
****Plasmid DNA**	Small loops of DNA containing a few genes.
****Flagellum**	A tail used for movement.
****Eukaryotic cells**	Cells with a nucleus.
****Prokaryotic cells**	Cells without a nucleus.
***Standard form**	A way of writing numbers in terms of powers of ten. E.g. $0.015 = 1.5 \times 10^{-2}$ $0.000458 = 4.56 \times 10^{-4}$ The index of ten (the 'minus' number) tell you which decimal point to start on.



7. Digestive enzymes	
***Digestion**	Breaking large food molecules down into ones small enough to absorbed by the small intestine.
***Catalyst**	A substance that speeds up a chemical reaction without being used up.
***Enzyme**	A protein that works as a catalyst to speed up the reactions in our cells.
***Digestive enzymes**	Enzymes that break large food molecules down into smaller ones.

****Amylase**	**Where found:** saliva, small intestine **What it does:** breaks down starch into simple sugars such as maltose
****Lipase**	**Where found:** small intestine **What it does:** breaks down fats into fatty acids and glycerol
****Protease**	**Where found:** stomach (pepsin), small intestine (trypsin) **What it does:** breaks down proteins into amino acids

8. How enzymes work	
***Substrate**	The chemical(s) that an enzyme works on.
***Active site**	An area of an enzyme with the same shape as the substrate.
****Lock and key mechanism**	The substrate moves into the active site and reacts to form the products. The products leave the active site so another substrate can then enter and so on.
****Specificity**	Each enzyme can only work on one substrate because the shape of the active site has to match.
***Denature**	When the shape of the active site changes shape so the enzyme stops working.



9. Factor affecting enzymes	
***Optimum temperature**	The temperature when an enzyme works fastest (about 37° for human enzymes).
****Changing the temperature**	**Increasing to optimum**: rate increases because particles move faster **Increasing past optimum:** rate decreases as enzyme denatures
***Optimum pH**	The pH when enzymes work fastest (around pH 6-8 for most human enzymes)
****Changing pH**	Rate decreases as you move away from the optimum because the enzyme denatures.
****Increasing substrate concentration**	At first the rate increases, but then it levels out as the enzyme is working as fast as possible.

10. Core practical – enzymes and pH (CP2)	
***CP2 – key question**	How does the rate that amylase works change as you change the pH?
***CP2 – Prepare your reactants**	Place starch solution, amylase solution and pH 7 buffer into separate test tubes and warm them in a water bath at 40°C
***CP2 – Prepare your dropping tile**	Place a few drops of iodine solution into each well of a spotting tile.
***CP2 – Start the reaction**	Mix reactants together, start the stop watch and keep the mixture warm in the water bath.
***CP2 – Test for starch**	Remove a small amount of mixture and place in a well on the spotting tile.
***CP2 – Record your results**	Repeat the test until the mixture does not go black (no starch). Record the time.
***CP2 – Vary the pH**	Repeat with different pH buffers from pH 3 to pH 10
***CP2 – Results**	The amylase works fastest around pH 7 and more slowly at pH high or lower than this.

11. Cell transport	
***Concentration**	The number of particles in a given volume (the strength of a solution).
****Concentration gradient**	The difference in concentration between two neighbouring areas.
***Diffusion**	The movement of particles from high to low concentration (down a concentration gradient).
***Diffusion examples**	**Lungs:** oxygen into blood, carbon dioxide out of blood **Leaf:** carbon dioxide into leaf, oxygen out of leaf.
****Partially permeable membrane**	A membrane that allows some molecules but not others to pass through it (like a cell membrane).
****Osmosis**	The movement of water across a partially permeable membrane from high water/low solute conc to low water/high solute conc.
****Osmosis examples**	Water into plant roots, water in/out of any cells.
***Active transport**	Using energy to move substances from low to high concentration (up a concentration gradient).
***Active transport examples**	Minerals being absorbed into plant roots.

12. Core practical – osmosis in potatoes (CP3)	
***CP3 – Prepare potatoes**	Cut six similar pieces of potato, blot them dry and weigh them.
***CP3 – Run the experiment**	Place each potato piece in a test tube with sucrose (sugar) solutions with concentrations from 0% to 50%
***CP3 – Record results**	Blot each potato piece dry and re-weigh it.
***CP3 – Calculate percentage mass change**	% change = (final value – starting value) / starting value x 100
***CP3 – Results**	Potato in weaker sucrose solutions gain mass because water enters potatoes by osmosis, those in stronger solutions lose mass as water leaves by osmosis.

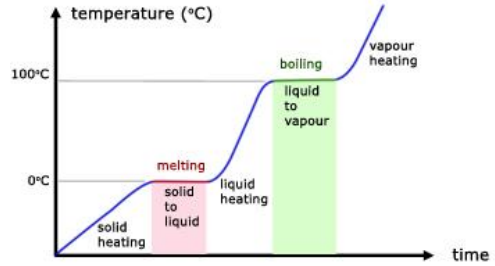
C1 & 2: States of matter and separating substances

Lesson sequence

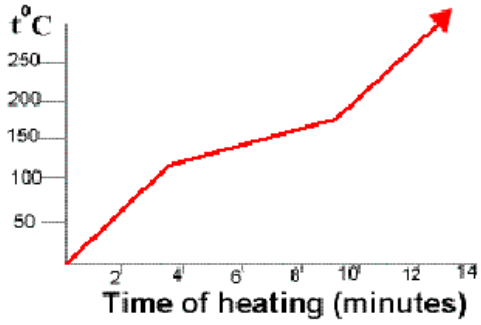
1. States of matter
2. Mixtures
3. Filtration and crystallisation
4. Paper chromatography
5. Distillation
6. Core practical – investigating inks (CP7)
7. Drinking water

1. States of matter	
***Particle**	The tiny pieces that all matter is made from.
***Atom**	The smallest independent particle. Everything is made of atoms.
***Molecule**	A particle made from two or more atoms bonded together.
***State of matter**	Whether a substance is solid, liquid or gas.
***Particle model**	A theory that uses the idea of particles to explain the differences between solids, liquids and gases.
***Solid**	**Particle arrangement:** Regular pattern, touching each other. **Particle movement:** Vibrating around a fixed point.
***Liquid**	**Particle arrangement:** Random, touching each other. **Particle movement:** Moving around
***Gas**	**Particle arrangement:** Random **Particle movement:** Moving quickly
***State changes**	Solid to liquid = melting Liquid to solid = freezing Liquid to gas = evaporating or boiling Gas to liquid = condensation Solid to gas = sublimation Gas to solid = deposition

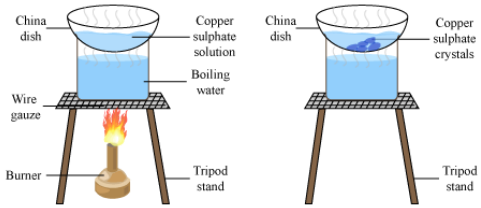
****Heating curve for a pure substance**	Temperature rises as you heat a solid, levels out as it melts, continues rising once fully liquid, levels out whilst boiling and rises again once fully gas.



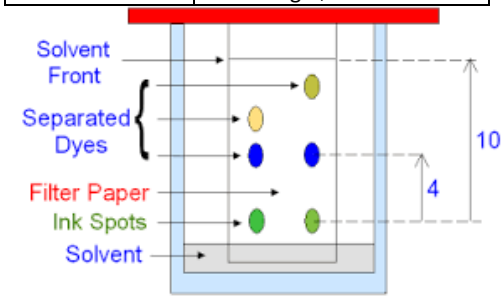
2. Mixtures	
***Element**	A substance made from only one type of atom.
***Compound**	A substance made from two of more different elements bonded together.
***Mixture**	A substance made of two of more substances (elements or compounds) mixed but not bonded together.
****Melting point of mixtures**	Mixtures do not melt at a fixed temperature but melt gradually over a range of temperatures.
****Heating curves of mixtures**	The flat sections of the heating curves of a pure substance are sloped for a mixture.



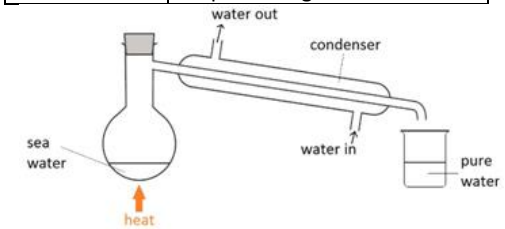
3. Filtration and crystallisation	
***Dissolve**	When a substance mixes with a liquid by breaking down into individual particles (atoms or molecules).
***Soluble**	When a substance can be dissolved by a liquid.
***Insoluble**	When a substance can't be dissolved by a liquid.
***Filtration**	A method of separating a mixture of a liquid and an insoluble solid by passing it through a filter paper.
****Residue**	The solid that gets left behind in the filter paper.
****Filtrate**	The liquid that passes through the filter paper.
****How filtration works**	The filter paper contains many tiny holes. The water molecules are small enough to pass through the holes, the solid particles are too big and get trapped.
***Solution**	A mixture of a solute dissolved in a solvent.
****Solvent**	A liquid that has dissolved a substance, for example water.
****Solute**	A solid that has been dissolved, for example salt.
***Crystallisation**	A method of collecting the dissolved solid from a solution by heating it so that the solvent evaporates away.
****Risks of crystallisation**	As the solvent boils away, the hot solution can spit, so you should wear safety goggles to protect your eyes.

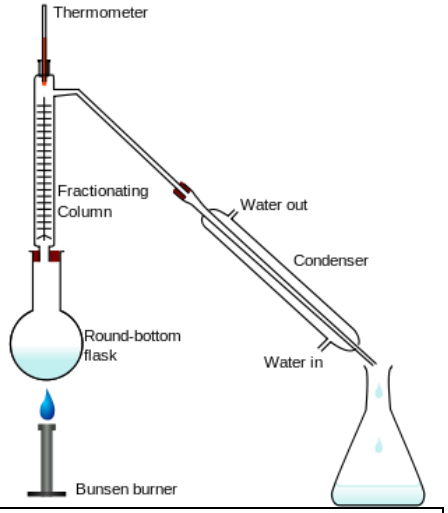


4. Paper chromatography	
***Paper chromatography**	A method of separating out mixtures of liquids to show what is in them, by letting them travel up a piece of chromatography paper.
***Chromatography method**	1. Draw pencil line on paper 2. Place sample spot on line 3. Place paper in solvent, with solvent below pencil line. 4. Allow solvent to soak up the paper 5. Stop when solvent near top, and mark how far it gets.
****Stationary phase**	The substance the solvent moves through – usually paper (Note: technically it is a thin layer of water from air that is bound to the paper molecules)
****Mobile phase**	The solvent.
****R_f (retardation factor)**	R_f = spot distance / solvent distance
****Uses of R_f**	R_f enables you to identify a substance because for a given solvent and stationary phases, it is unique to each substance.
****Uses of chromatography**	- To tell between pure and impure substances - To identify substances by comparison with known ones - To identify substances by calculating R_f.

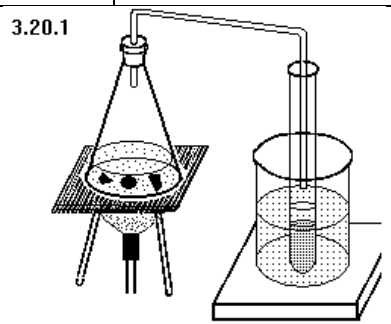


5. Distillation	
***Distillation**	A method used to collect pure liquid from a solution, such as getting pure water from seawater.
****Condenser**	A glass tube surrounded by a glass jacket containing cold tap water. Used to condense gases back to liquids.
****How distillation works**	The solution is heated until it is hot enough for the solvent to boil. The solvent is then passed through a cool condenser where it turns back to liquid. The solute does not get hot enough to evaporate and stays where it is.
****Anti-bumping granules**	Jagged grains of glass that are added during distillation to prevent violent boiling.
***Fractional distillation**	A type of distillation used to separate mixtures of two or more liquids.
****How fractional distillation works**	The liquid with the lowest boiling point boils first and can be collected, then the next boils and so on.
****Fractionating column**	A tall glass column used during fractional distillation that gives a better separation of the liquids by producing a temperature gradient.





6. Core practical – investigating inks (CP7)	
***CP7 – Aim**	To separate inks using distillation and chromatography.
***CP7 – Distillation set up**	Place some ink in a conical flask with a side arm and delivery tube attached, place the flask on a tripod above a Bunsen burner. Place a boiling tube in a beaker of ice and place the delivery tube into the boiling tube.
***CP7 – Run the distillation**	Light the Bunsen burner and allow the ink to boil, stop once a few drops of liquid have collected.
***CP7 – Distillation results**	Pure water collects in the test tube because it boils and the cold ice condenses the vapours back to liquid. The ink gets darker because there is less water to dilute it.
***CP7 – Chromatography setup**	1. Draw pencil line on paper 2. Place ink spot on line 3. Place paper in solvent, with solvent below pencil line. 4. Allow solvent to soak up the paper 5. Stop when solvent near top, and mark how far it gets.
***CP7 – Chromatography - calculate Rf**	Measure how far each of your spots has moved from the line and how far the solvent has moved. Rf = spot distance / sample distance.
***CP7 – Chromatography results**	The ink separates into multiple different spots. The one that moves furthest is most soluble in the water.



7. Drinking water	
***Potable water**	Water that is safe to drink.
***Desalination**	Producing pure water from seawater.
****Purifying seawater**	The seawater is distilled: heating the water to produce water vapour and condensing it back to liquid. Uses lots of energy.
****Uses of pure water**	Pure water has to be used when chemists analyse substances to fins out what they contain. Tap water contains many dissolved substances that could interfere with this.
****Water treatment in the UK**	Water is passed through a sedimentation tank, to allow sediment to settle out, it is passed through a filtration tower to remove floating particles, chlorine is added to kill bacteria.

P1: Motion

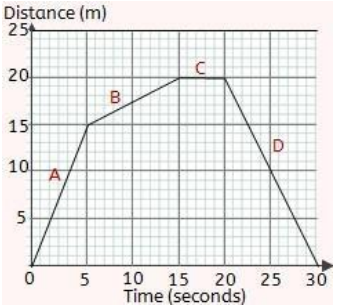
Lesson sequence

1. Vectors and scalars
2. Speed-time graphs
3. Distance-time graphs
4. Acceleration
5. Velocity-time graphs

1. Vectors and scalars	
Magnitude	A scientific word for size.
Scalar quantity	A quantity with magnitude (but no direction).
Scalar examples	Distance – 10 m Speed – 25 m/s Mass – e.g. 50 kg
Vector quantity	A quantity with magnitude and direction.
Vector examples	Displacement – 10 m north Velocity – 25 m/s east Force – 30 N left Acceleration – 3 m/s^2 south Momentum – 400 N m/s right
Vector arrows	Vectors can be represented by arrows, with the length of the arrow representing the magnitude.
Displacement	The distance and direction travelled in a straight line.
Velocity	Your speed in a certain direction.

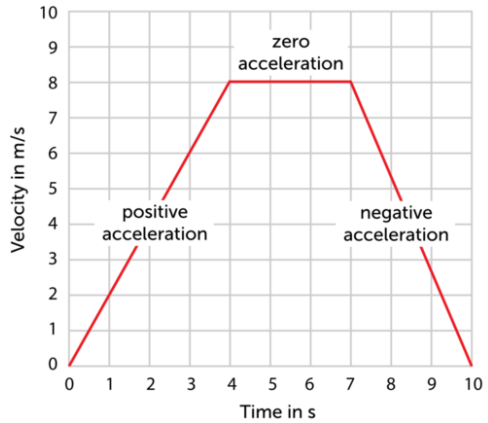
2. Speed	
Units of speed	Metres per second, m/s.
Speed – word equation	Speed = distance / time Speed = m/s Distance = m Time = s
Speed – symbol equation	v = x/t v = speed x = distance t = time
Instantaneous speed	Speed at a particular point in time.
Average speed	The average speed across the whole of a journey, calculate from v = x/t.
Calculating distance travelled – word equation	Distance = average speed x time x = v x t Distance = m Average speed = m/s Time = s
Measuring speed	Measure the distance between two points and time how long an object takes to pass, then calculate using v = x/t.
Light gates	Equipment that can be used for measuring time accurately with fast-moving objects to help find their speed.
Some typical speeds	Walking – 1-2 m/s Running – 3-8 m/s Cycling – 5-20 m/s Driving – 10-40 m/s Flying – 250 m/s

3. Distance-time graphs	
Distance-time graph	A graph describing how your distance from the start changes over the course of a journey. Time is on the x-axis and distance on the y-axis.
Distance-time graphs – stationary	Horizontal line
Distance-time graphs – constant speed	Forwards – line sloping up Backwards – line sloping down
Distance-time graphs – line gradient	Steeper line = faster
Calculating speed from a distance-time graph	Speed = change in distance / change in time Speed = change in y / change in x



4. Acceleration	
Acceleration	Changing velocity
You accelerate when…	- You change speed - You change direction
Units of acceleration	Metres per second squared, m/s^2
Positive and negative acceleration	Positive acceleration = speeding up Negative acceleration = slowing down
Deceleration	Slowing down, negative acceleration.
Acceleration – word equation	Acceleration = change in speed / time Acceleration = m/s^2 Change in speed = m/s Time = s
Acceleration – symbol equation	a = (v – u)/ t a = acceleration v = final speed u = initial speed t = time
Linking acceleration and Velocity travelled	Use the equation: x = ($v^2 – u^2$) / 2a x = Velocity travelled a = acceleration v = final speed u = initial speed
Acceleration during free fall	10 m/s^2

5. Velocity-time graphs	
Velocity-time graph	A graph showing how your velocity (speed) changes over time. Time is on the x-axis, velocity is on the y-axis.
Velocity-time graphs – constant speed	Horizontal line
Velocity-time graphs – acceleration	Speeding up – line sloping up Slowing down – line sloping down
Velocity-time graphs – Stationary	Horizontal line on the x-axis
Velocity-time graphs – line gradient	Steeper line = greater acceleration
Calculating acceleration on a velocity-time graph	Acceleration = change in velocity/ change in time Acceleration = change in y / change in x
Calculating distance travelled from a velocity-time graph	Distance = area under the graph. Divide the graph into rectangles and triangles, find the area of each and add them together.



Science

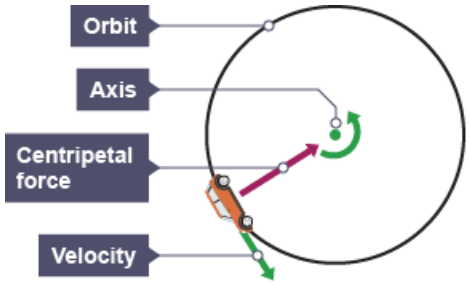
P2: Forces and motion

Lesson sequence

1. Resultant forces
2. Newton's first law
3. Mass and weight
4. Newton's second law
5. Core practical – investigating acceleration (CP12)
6. Newton's third law
7. Momentum (HT)
8. Stopping distances
9. Car safety

1. Resultant forces	
***Scalar quantity**	A quantity with magnitude (but no direction).
***Vector quantity**	A quantity with magnitude and direction.
***Force arrows**	Arrows can be used to represent forces: - Direction = direction of force - Length = size of force
****Resultant force**	The force left over when forces acting in opposite directions are cancelled out.
****Calculating resultant force**	Subtract the total force in one direction from the total force in the other direction.
***Balanced forces**	When the resultant force is zero (because forces acting in opposite directions are the same size).
***Unbalanced forces**	When the resultant force is non-zero (because there is more force in one direction than another).

2. Newton's first law	
***Newton's first law of motion**	An object will move at the same speed and direction unless it experiences a resultant force.
****The effect of resultant forces**	Resultant forces cause acceleration: speeding up, slowing down or changing direction
****Effect of forces on motion**	Forces make you start moving, stop moving or change direction, they are not needed to keep you moving!
*****Circular motion**	Moving in a circle is a type of acceleration because you are changing velocity (your direction changes even if your speed does not).
*****Centripetal force**	A force acting towards the centre of a circle that enables objects to move in a circle.
*****Sources of centripetal force**	Gravity – keeps the Earth orbiting the sun Tension – lets a bucket swing in circles on a rope Friction – keeps cars turn round a roundabout



3. Mass and weight	
***Mass**	The quantity of matter in an object is made of. Units = kilograms, kg.
***Weight**	A force caused by gravity pulling downward on an object. Units = newtons, N.
***Force meter**	An instrument for measuring forces. They usually involve a spring that stretched more the more the force.
****Gravitational field strength**	The strength of gravity, which is different on different planets.
	Units = newtons per g=kilogram, N/kg.
****Gravitational field strength on Earth**	10 N/kg
****Calculating weight**	Weight = mass x gravitational field strength W = m x g Weight = N Mass = kg Gravitational field strength = N/kg
****Air resistance**	A force greater by the air pushing against you as you move. Faster movement ⇒ greater air resistance.
*****Motion whilst falling**	Accelerate until the air resistance is equal to the weight; now there is no resultant force so speed stays constant.

4. Newton's second law	
***Newton's second law of motion**	Force = mass x acceleration
****Acceleration is greater when…**	- The force is greater - The mass is smaller
***Calculating forces**	Force = mass x acceleration F = m x a Force = N Mass = kg Acceleration = m/s^2
***Calculating acceleration**	Acceleration = mass / force a = F / m Force = N Mass = kg Acceleration = m/s^2
*****Inertial mass**	The mass calculated by measuring the acceleration produced by force, using the equation 'm = F / a'
*****The point of inertial mass**	Inertial mass is the same as mass measured with a mass balance, but it gives us a way to measure mass where there is no gravity, such as in space.

5. Core practical – investigating acceleration (CP12)	
***CP12 - Aim**	To investigate how changing force changes acceleration.
***CP12 - Setup**	A trolley on a ramp with 90 g masses. 10 g mass hanger attached to trolley via a string over a pulley.
***CP12 – Data collection**	Release the trolley, use light gates to measure the acceleration.
***CP12 – Variations**	Move 10 g of mass from the trolley to the mass hanger each time.
***CP12 – Independent variable**	The force: each 10 g mass = 0.1 N force
***CP12 - Results**	Ore mass ⇒ more force ⇒ greater acceleration.

6. Newton's third law	
***Newton's third law**	For every action force there is an equal but opposite reaction force.
***Action force**	The force you push or pull with.
***Reaction force**	A force of the same size but opposite direction to an action force.
***Action-reaction forces**	If, A applies an action force to B, B applies a reaction force of same size and opposite direction to A.
****Action-reaction vs balanced forces**	Similarities: same sizes, opposite directions Differences: balanced forces act on same object, action-reaction act on different objects
*****Action-reaction forces - collisions**	E.g. kicking a ball: the foot pushes the ball, the ball pushes back on the foot.

7. Momentum (HT)	
***Momentum**	The tendency of an object to keep moving.
***Calculating momentum**	Momentum = mass x velocity field strength p = m x v Momentum = kg m/s Mass = kg velocity = N/kg
Momentum and force calculations	Force = change in momentum / time F = (mv – mu)/t Force = N Mass = kg Velocity = m/s Time = s
****Conservation of momentum**	Total momentum before and after a collision is the same.

8. Stopping distances	
***Stopping distance**	The distance travelled from when a hazard is seen to when you fully stop.
***Thinking distance**	The distance travelled from when a hazard is seen to when you brake.
***Braking distance**	The distance travelled from when you brake to when you fully stop.
****Calculating stopping distance**	Stopping distance = thinking distance + braking distance
****Thinking distance and reaction time**	Slower reactions = greater thinking distance
****Thinking distance increased by…**	Higher speed, tiredness, illness, drugs, distractions, old age
****Braking distance increased by**	Higher speed, poor brakes, poor tyres, wet/icy/gravelly road, downhill, heavier load

9. Crash hazards	
****Crash danger**	Crashes involve large decelerations, creating large forces which can injure you.
****Car safety features**	Increase the time a collision takes, reducing deceleration and forces.
****Three car safety features**	Crumple zones, (stretchy) seat belts, air bags
*****Collision forces**	Greater momentum change greater force
****Calculating collision forces**	Force = change in momentum / time F = (mv – mu)/t Force = N Mass = kg Velocity = m/s Time = s

KS3 PE THEORY KNOWLEDGE ORGANISER

Nutrition

Carbohydrate – The main and preferred source of energy for all types of activity. Required for High-Low intensity energy. Provided in bread, potatoes and sugary foods.

Fats – Used for low intensity energy. Comes in two forms; saturated fats (unhealthy) and unsaturated fats (healthy).

Protein – Required for tissue growth and repair and for a small amount of energy. Provided by meat, fish, eggs and dairy.

Minerals – Required for bone growth and maintenance of a healthy body. Found in vegetables, dairy and more

Vitamins – Required for health, energy and maintaining normal body functions. Found in vegetables and fruit.

Fibre – Required to reduce cholesterol and helps the digestive system (preventing constipation)

Energy Systems

Anaerobic – Exercise without the presence of oxygen. Short distance/time and high intensity – 100m – Usain Bolt

Aerobic – Exercise in the presence of Oxygen. Long distance and low intensity – Marathon Runner – Mo Farah

Types of Training

Continuous Training – Long distance steady state exercise – good for distance athletes

Fartlek Training – Altering the speed (Walk, Jog, Run, Sprint) – Good for games players

Interval Training – Periods of work and rest. (HIIT). Good for sports with rest periods

Weight Training – Lifting a resistance to increase muscle strength – Good for all athletes.

Plyometrics – Jumping, Bounding and Hopping to build power – Good for jumping athletes.

Circuit Training – Organisation of different exercises into a circuit – Good for all athletes as can be made specific.

Static Stretching – Isometric stretching to increase the flexibility of muscles – Helps prevent injury in all sports.

Types of Bones

Long Bones – Used for movement and blood cell production – Femur

Flat Bones – Strong, flat plates of bone used for protection – Ribs

Short Bones – Wide as they are long. Used for support – tarsals

Sesamoid Bones – Bone found in a tendon to allow smooth movement – Patella

Irregular Bones –

These simply do not fall into another category – Vertebrae