Knowledge Organisers are designed to help and support you to learn the key knowledge within the subjects you study.

In addition to your Knowledge Organisers Learning Consultants may still provide Independent Learning to further develop your skills, knowledge and understanding within the subject.

'The best advice I ever got was that knowledge is power and to keep reading'.

David Bailey.

Using your Knowledge Organisers

Expectations:

- Study at least one section of a Knowledge Organiser for independent learning (homework) each evening. Aim to spend at least 30 minutes on this.
- You will also be tested in your lessons on the information on your Knowledge Organiser.

How to get the most out of your Knowledge Organisers:

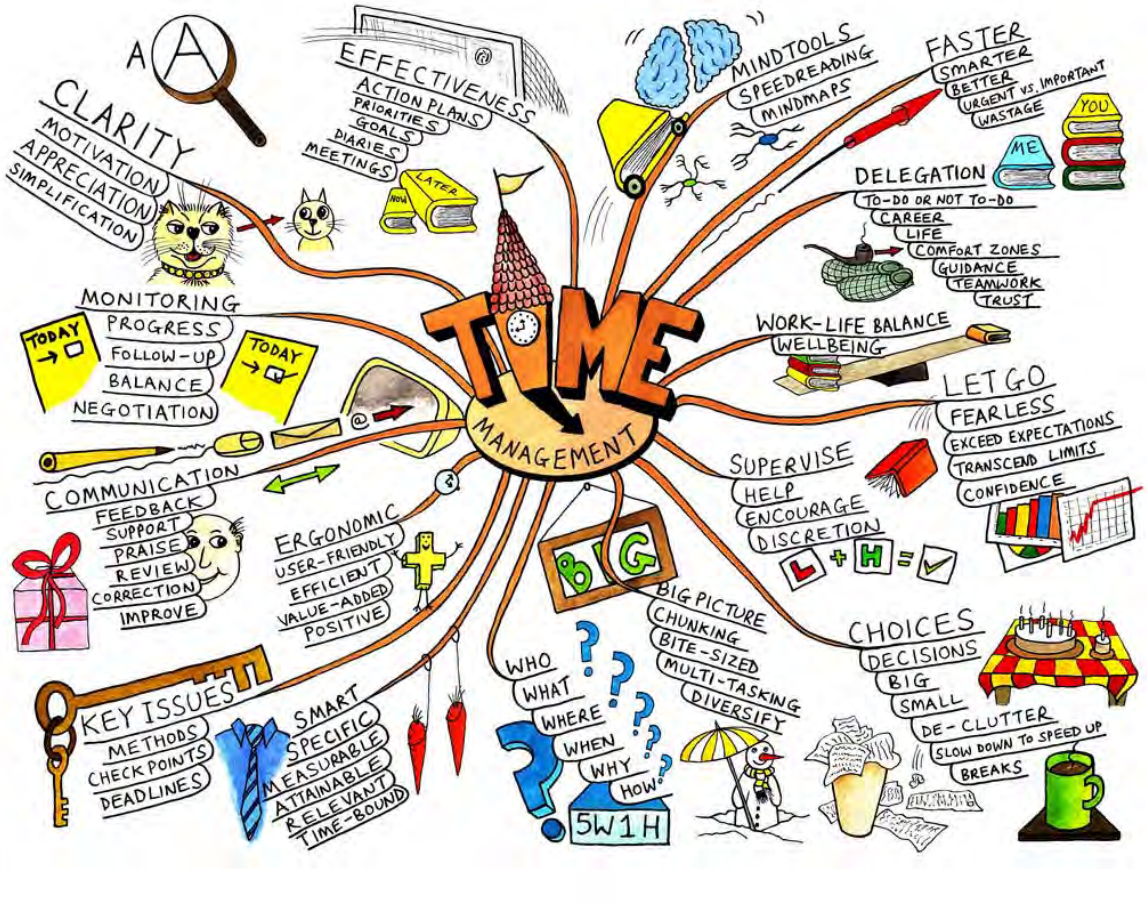
- Sometimes your Learning Consultant may tell you how to use certain sections of your Knowledge Organisers. In addition, they are a very useful tool for independent study and will help ensure that you know many of the facts and key areas of information in each of your subject areas. You can use your Knowledge Organisers in a number of different ways, including:
- Use the 'Thinking Hard' strategies to refine your notes from the Knowledge Organiser
- Write your own challenging questions on a section. Leave these until the next day to answer
- Ask someone to write or ask you questions based on a section.
- Put keywords into complete sentences
- Look, Cover, Write and Check key words and terminology to help with spelling
- Carry out further research on a topic
- Create mind maps, flash cards, timelines, diagrams to aid with revision
- Self test

Mind Mapping

Mind Mapping is a process that involves a distinct combination of imagery, colour and visual-spatial arrangement. The technique maps out your thoughts using keywords that trigger associations in the brain to spark further ideas.

How to mind map:

https://www.youtube.com/watch?v=u5Y4pIsXTV0

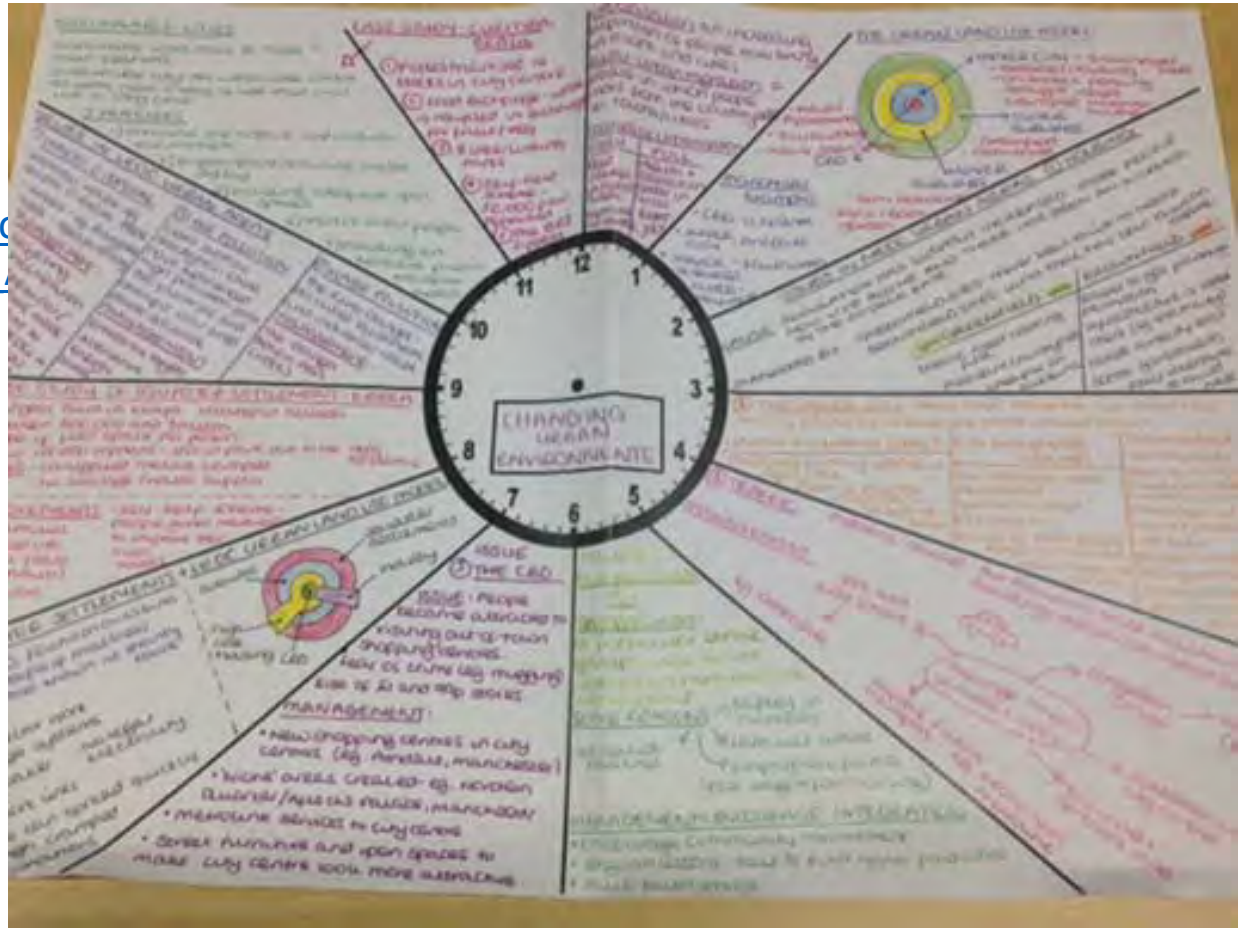


Revision Clock

Make notes in each chunk of the clock. Revise each slot for 5 minutes, turn the clock over and then try to write out as much information as you can from one of the segments. Eg. all the information in the 2-3pm segment.

Revision clock template:

https://www.google.co.uk/search?q=revision+clo
d=0ahUKEwi1gMD6wfLeAhWNzqQKHaHSChkQ_A
cM:&spf=1543251070019



Flash Cards

- To make your own, take some card and
- cut into rectangles roughly 10cm x 6cm
- You could write down the key content of the topic and then try to reduce this to keywords to summarise the topic
- You could then write the keyword on one side and the definition on the other.
- Then go through your cards looking at one side and seeing if you can remember the keyword/definition on the other side.
- Prioritise cards you have previously got wrong.

The Thinking Hard Process

Knowledge and understanding

Reduce
Transform
Deconstruct
Derive

Analysis and application

- Prioritise
- Categorise
- Criticise
- Trends and patterns
- Practise

Flexibility of thinking

- Make connections
- Compare
- Extend
- Create

Reduce it

Reduce the key information into 20 words.

Reduce it

Key information:

Reduce it

Sum up the key information into 5 bullet points.

Reduce it

1.
2.
3.
4.
5.

Reduce it

Write 3 questions that the knowledge organiser has answered so far.

Reduce it

1.
2.
3.

Reduce it

Sum up the content of the knowledge organiser into three key words and justify why you have chosen them.

Reduce it

1.
2.
3.

Transform it

Transform it

Transform the knowledge organiser into a series of pictures.

Transform it

Transform it

Transform the knowledge organiser into a piece of poetry.

Transform it

Transform it

Transform the knowledge organiser into a mnemonic.

Transform it

Transform it

Transform the knowledge organiser into a series of flash cards

Deconstruct it

Now that you have some new information, write the title in the box and deconstruct it. From the title and new information, tell us what the knowledge organiser is all about.

Deconstruct it

Title:

Deconstruct it

Take part of the Knowledge organiser and deconstruct it into a flow chart or a process diagram. What are the links?

Deconstruct it

Title:

Prioritise it

Prioritise it

1. _____
2. _____
3. _____

Prioritise the knowledge you have learnt from sections of your organiser.

From most important to least important.

Categorise it

Categorise it

_____

Order the information from you Knowledge Organiser into different categories or groups.

Criticise it

Criticise it

Topic or title:

_____

Can you criticise parts of your knowledge organiser? Is all the information factually true? How do we know?

Practice it

Practice it

Exam Question:

_____

Write your own exam question based on your knowledge organiser.

Answer it.

Connect it

Connect it

Write down 4 key words from your knowledge organiser.

Connect them to each other using lines and say why they connect along the line.

Connect it

Connect it

How the information on the knowledge organiser link to another topic we have studied?

Connect it

Connect it

You're the information on the knowledge organiser to answer your 'Big picture' questions.

Connect it

Connect it

Draw a mind map showing how aspects of your knowledge organiser are linked together

Compare it

Compare two aspects of your knowledge organiser. How are they different? How are they the same?

Compare it

Extend it

Write down 5 key words from the knowledge organiser.

Define those key words and use then in a sentence.

Extend it

Key words:

Extend it

Collect or draw ten pictures to represent the information on the knowledge organiser.

Extend it

Extend it

Write 50 words to explain the content on your knowledge organiser.

Extend it

Create it

Create a ‘foldable’

To show what you have learnt from the knowledge organiser.

Create it

Create it

Create a short test about what we have been learning about so far.

Write the model answers in your book.

Create it

Question 1:

Answer:

Question 2:

Answer:

Question 3:

Answer:

Create it

Create a series of flashcards with the key information on from your knowledge organiser

Create it

Create it

Create a set of Cornell notes detailing key ideas from the knowledge organiser.

Create it

Learning Question:

Year 10 Knowledge Organisers

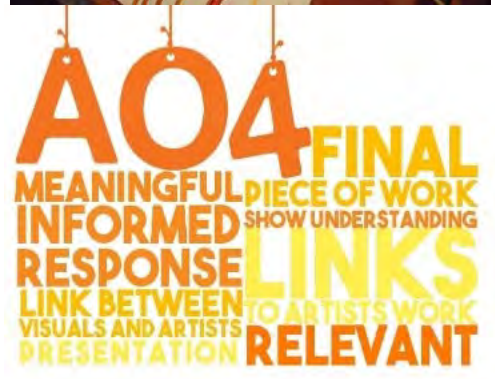
Art

GCSE Art Assessment Objectives

Artist Research
Contextual Links
Gallery Visits

Experimentation with materials, processes and techniques

Development and refinement of ideas



Final outcome demonstrating contextual links

Sentence Starters

The main subject in this artist's work is...

I would describe the artist's style as...

The composition in this painting...

I like their work because...

Something I don't like about their work is...

The colours this artist uses...

The main kind of line this artist uses...

In my own work I would like to...

I think this is the most original painting because...

The backgrounds in their work are...

This artist uses texture because...

This artist's work makes me feel...

I would like to paint like this artist because...

If I could interview this artist I would ask them...

Art analysis word bank

Visual language – the top 10 things to talk about

Technique	Colour	Composition	Shape	Subject
Light	Media	Mood	Style	Story

Word Bank

Colour	Composition	Mood	Style	Light	Technique	Media
Blend	Background	Alive	Abstract	Artificial	Palette knife	Textile
Bright	Blurred	Atmospheric	Derivative	Contrast	Drawn	Collage
Clashing	Complex	Calm	Distorted	Dark	2 dimensional	Print
Cold	Confused	Delicate	Emotional	Evening	3 dimensional	Photograph
Contrast	Distance	Depressing	Exaggerated	Fierce	Texture	Computer
Deep	Eye line	Dignified	Exterior	Gentle	Shading	generated
Dull	Focus	Disturbing	Fake	Harsh	Mark-making	Pencil
Glowing	Foreground	Fresh	Fantasy	Hazy	Impasto	Ink
Harmonious	Form	Exciting	Figurative	Intense	Tone	Mixed media
Intense	Line	Flamboyant	Impressionistic	Natural	Underpainting	Installation
Luminous	Middle ground	Expressive	Landscape	Shady	Overpainting	Sculpture
Mixed	Movement	Humorous	Religious	Shadowy	Cross hatching	Paint
Monochrome	Near	Imposing	Representational	Warm	Stippling	Charcoal
Opaque	Perspective	Nostalgic	Still life		Scumbling	Graphite
Pale	Scale	Sad	Sketch		Hatching	Acrylic
Primary	Shape	Sentimental	Surreal		Layered	Watercolour
Pure	Space	Tranquil	Symbolic		Linear	Stitch
Secondary	Symmetry				Continuous line	Pastel
Tone					Scratch	Chalk
Translucent					Spray	Felt pen
Transparent					Resist	Fine liner
Vibrant					Stencil	Biro
Warm					Manipulation	Bleach
					Scribble	Photoshop

Year 10 Knowledge Organisers

Computing

GCSE Knowledge Organiser

Computer Science

Role & Function of CPU Components

CPU

•ROLE: The central processing unit (CPU) of a computer is a piece of hardware that carries out the instructions of a computer program. It performs the basic arith metical,

•The Four Primary Functions of the CPU. The CPU processes instructions it receives in the process of decoding data. In processing this data, the CPU performs four basic steps.

ALU

•An arithmetic logic unit (ALU) is a digital circuit used to perform arith metic and logic operations. It represents the fundamental building block of the central processing unit (CPU) of a computer. Modern CPUs contain very powerful and complex ALUs

•FUNCTION: performs all the arith metic and logical operations such as addition, subtraction, logical AND, OR etc.

L1 & L2 CACHE

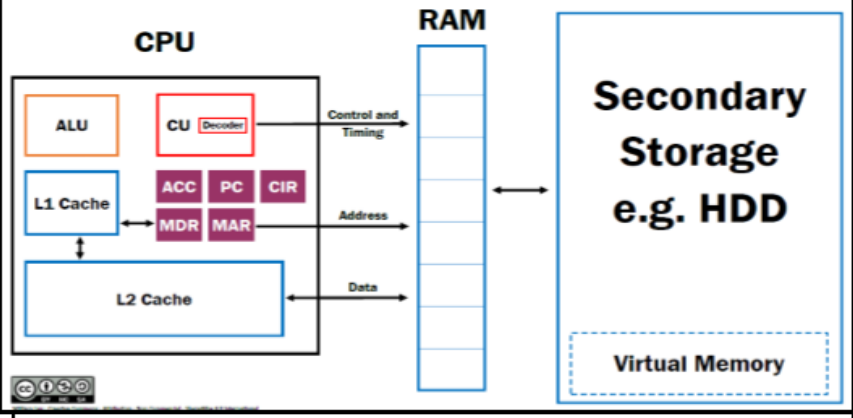
•Cache memory, lies in between CPU and the Main memory. It is also called CPU memory, that a computer microprocessor can access more quickly than it can access regular RAM.

•The basic purpose of cache memory is to store program instructions that are frequently re-referenced by software during operation.

CU

•The control unit (CU) is a component of a computer's central processing unit(CPU) that directs the operation of the processor. It tells the computer's memory, arithmetic and logic unit and input and output devices how to respond to the instructions that have been sent to the processor.

Computer Systems - Von Neumann Architecture



REGISTERS

An accumulator is a register for short-term, intermediate storage of arith metic and logic data in a computer's CPU (central processing unit)

•Memory Address Register (MAR): It stores address of data or instructions to be fetched from memory.

•Memory Data Register (MDR): holds data waiting to be written in or data read from the location pointed by the MAR.

•Current Instruction Register (IR): is the part of a CPU's control unit that holds the instruction currently being executed or decoded.

•Program Counter (PC): It holds the address of the next instruction to be executed from memory. After each instruction is processed it increments by 1.

BUSES

Control and Timing: The control bus carries the control, timing and coordination signals to manage the various functions across the system.

•Address: carries the address of the piece of memory or I/O device to be read from or written to. It is a unidirectional bus, which is to say that data travels only one way; from the CPU to memory. The number of lines on the bus determines the number of addressable memory elements.

•Data: transfers data to and from the memory of a computer, or into or out of the central processing unit (CPU)

RAM is considered volatile memory, which means that the stored information is lost when there is no power. So, RAM is used by the central processing unit (CPU) when a computer is running to store information that it needs to be used very quickly, but it does not store any information permanently.

•These files may include various programs such as operating system, etc. RAM allows for faster access to files, as compared to other types of data storage.

•RAM works in conjunction with the hard drive, which takes care of long-term storage, to provide quick access to files that the computer is actively reading or writing.

SECONDARY STORAGE

•The function of secondary storage is the long-term retention of data in a computer system. ... Unlike primary storage,secondary storage also doesn't directly access the computer's CPU. Secondary storage retains data long-term when computers are turned off or restarted.

•Secondary storage is necessary because memory, or primary storage, loses its data when a computer is turned off whereas secondary storage does not. Therefore, it is commonly known as non-volatile storage.

VIRTUAL MEMORY

•Is a memory management capability of an operating system (OS) that uses hardware and software to allow a computer to compensate for physical memory shortages by temporarily transferring data from random access memory (RAM) to disk storage.

•With virtual memory, what the computer can do is look at RAM for areas that have not been used recently and copy them onto the hard disk. This frees up space in RAM to load the new application. ...

Year 10 Knowledge Organisers

Drama

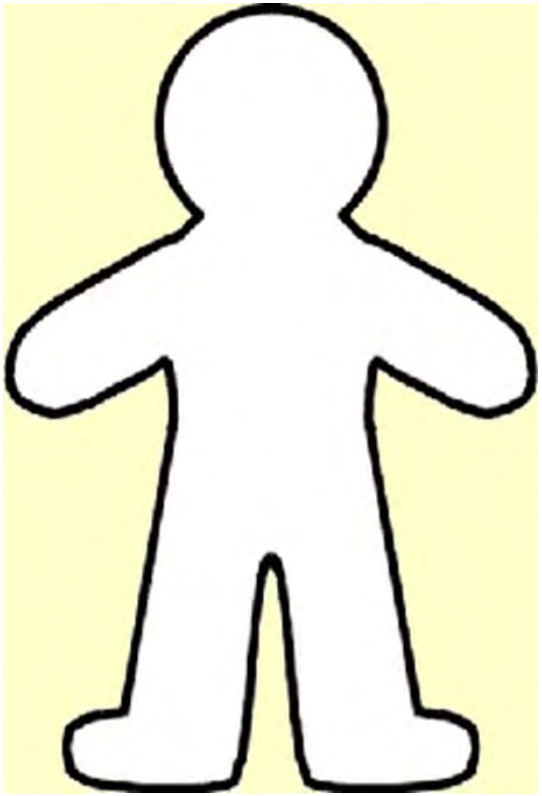
Devising Drama

Research and Developing:

Introduce your devised performance to the examiner – which of the 10 stimuli did you choose? Why did this stimulus stand out to you? Have you been inspired by any of the key drama practitioners? Who will your target audience be and why?

Creating and Developing:

Develop your character knowledge and understanding by creating a detailed Role on the Wall – consider the character's back story and this potential Stanislavskian influence on your performance.



Analysis and Evaluation:

Your log books and final evaluation should include the terminology below – can you define these key drama terms?

Characterisation	
Rehearsal	
Artistic intentions	
Social Context	
Set	
Props	
Stimulus	
Stage layout – SL, SR, CS, US DS	
Stanislavski	
Brecht	
Abstract drama	
Symbolism	
Semiotics	
Proxemics	
Genre	
Costume	
Tension	
Blocking	
Stimulus	
Target Audience	

Year 10 Knowledge Organisers

English

Language

Descriptive writing	Focused creating an image in the reader's mind and describing a scene in detail	**Narrative writing**	Focused on character, setting and plot development with descriptive elements as well as dialogue and action.

STRUCTURING A DESCRIPTION	
1. Overview	Describe the bigger picture (wide/panoramic)
2. Zoom in	Focus on an object and describe it in detail (close up)
3. The senses	Sights, sounds, smells, tastes, touch.
4. A person	Describe a person (or two) in an imaginative way, create personality through the way they move, speak and react.
5. Overview	Zoom back out, returning to the bigger picture (wide/panoramic)
6. Linking theme	Repeated reference to an object, person or idea throughout.

STRUCTURING A NARRATIVE	
1. Exposition	A narrative device often used at the beginning of a work that provides necessary background information about the characters.
2. Inciting Incident	An event that begins the action/plot.
3. Rising Action	Events leading up to the climax
4. Climax	Most exciting moment of the story; turning point
5. Falling Action	Events after the climax, leading to the resolution
6. Resolution	Ends the conflict and leaves reader content
7. Cliffhanger	A dramatic moment leaving suspense over what is to come
8. Flashback	A method of narration in which present action is temporarily interrupted so that the reader can witness past events
9. The one sentence opener	Start with a one-sentence paragraph or rhetorical question. Your next paragraph should then jump back in time. Recount the events leading up to this first line.
10. Twist in the tale	Tell the story in a way that suggests one thing about a character only to surprise the reader at the end.
11. Flipped narrative	Start with the end - the most dramatic moment (present tense) and then flashback to the events leading up to it.
12. A tale of two halves	Tell the incident from one character's perspective and then tell the whole thing again from a completely different point of view.

SENTENCE UPGRADES	
1. -Ing	Grabbing her bag, the woman stormed out of the shop.
2. Similes	Like a predator stalking its prey, the thief approached the boy.
3. Preposition	Under the dark clouds, the lamppost gleamed brightly.
4. Adverb	Cautiously, the girl reached out to touch the creature.
5. Connective	Despite the weather, the girl plunged into the sea.
6. -Ed	Petrified, the dog stood rooted to the spot.
7. Pair of adjectives	Pale and bright, the sun cast its light across the forest below.
8. Verb adverb	Perched precariously on a thin tree branch, a small robin sang.

LANGUAGE FEATURES	
1. Pun	A joke exploiting the different possible meanings of a word or the fact that there are words which sound alike but have different meanings
2. Symbol	An object or action in a literary work that means more than itself, that stands for something beyond itself.
3. Onomatopoeia	A word that imitates the sound it represents.
4. Euphemism	An indirect, less offensive way of saying something that is considered unpleasant
5. Personification	A figure of speech in which an object or animal is given human feelings, thoughts, or attitudes
6. Alliteration	Repetition of consonant sounds
7. Metaphor	A comparison of two things without using the word like or as.
8. Simile	A comparison of two things using like or as
9. Hyperbole	A figure of speech that uses exaggeration to express strong emotion, make a point, or evoke humor
10. Irony	A contrast or discrepancy between what is stated and what is really meant, or between what is expected to happen and what actually does happen.
11. Connotation	The experience (associations) we bring to a word
12. Oxymoron	A figure of speech in which apparently contradictory terms appear in conjunction
13. Extended Metaphor	When a writer exploits a single metaphor or analogy at length throughout a poem or story.
14. Imperative	A command
15. Declarative	A statement
15. Pathetic fallacy	A type of personification where emotions are given to a setting, an object or the weather.
16. Emotive language	Language intended to create an emotional response.

Transactional Writing Knowledge Organiser

Before you start writing think about the GAPS!

Genre – what are you being asked to write?

Audience – who are you writing for?

Purpose – what are you trying to achieve?

Style – formal or informal?

Genre

Article

Leaflet

Letter

Review

Speech

Purpose

Persuade

Argue

Advise

Inform

Speech

- Think about the GAPS
- Open with a welcome/greeting – e.g. 'Good afternoon ladies and gentlemen' or 'Fellow classmates'
- Outline what the speech will be about: 'I will talk to you about.'
- Make 3/4 key points and expand on them.
- Conclusion to summarise ideas
- End acknowledging the audience: 'Thank you for listening.'
- AFOREST techniques

Article

- Headline and Strapline
- Introduction to create interest – (include who, what, where, when, how and why?)
- 3-4 middle paragraphs
- Short out effective conclusion
- Lively style
- AFOREST techniques

Leaflet

- Present information so it is easy to find using headings and sub-headings
- Lively and engaging
- AFOREST techniques

Letter

- Address and date in the top right of the page
- Address of the person you are writing to on the left.
- Dear Mrs Fletcher = yours sincerely or Dear Sir/Madam. = yours faithfully
- Short introductory paragraph
- 3-4 middle paragraphs
- Concluding paragraph summarising ideas.

Review

- Introductory paragraph stating what is being reviewed and provide an overview of film/product
- Middle paragraphs provide positives and negatives.
- Conclusion to summarise ideas and give a recommendation
- Make your opinion clear
- Lively and engaging
- AFOREST techniques

How to vary your sentence starters

Adjective (rule of three)

Adverb

Connective/Discourse Marker

Preposition

Simile

Writer's Methods

Alliteration & anecdotes

Facts

Opinions

Repetition, rhetorical questions, reader (direct address)

Emotive language and exaggeration

Statistics

Threes (rule of three)

Connectives/Discourse Markers

Position

At the start

Firstly

Secondly

Thirdly

Next

Meanwhile

Subsequently

Finally

In conclusion

Emphasis

Importantly

Significantly

In particular

Addition

Furthermore

Additionally

In addition

As well as

Contrast

Although

Whereas

Otherwise

Alternatively

Nevertheless

Year 10 Knowledge Organisers

Food Technology

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Wheat- Bread

Bread is staple food in the UK. There are many varieties of bread; wholemeal, granary, white, spelt, soda and rye. They can be shaped in a variety of ways. Bread dough can be enriched with ingredients such as dried fruit, sugar, milk, butter and eggs to produce baked items like buns and pastries. Bread is a relatively low cost food, extremely versatile and relatively easy to make yourself.

Food Science

Sifting the flour: the sifting process introduces air which acts as a raising agent and helps the bread to rise in the oven.
Adding warm liquid Water hydrates the flour. At 37°C the liquid provides the optimum temperature for the yeast to ferment and produce the raising agent C02. Moisture is needed for a soft dough. Sugars are produced by this fermentation which the yeast consumes. As it does so it creates alcohol and carbon dioxide gas as a waste products.
Mixing and Kneading Dough during the mixing and kneading, two of the proteins present in the flour (gliadin and glutenin) become hydrated and when the dough is kneaded an elastic protein complex called gluten is formed. This gluten gives bread its structure and prevents it collapsing.
Proving Dough during this step some of the starch present in flour is broken down and is fermented by the yeast . C02 gas is produced which causes the gluten network to expand and therefore makes the dough rise; the quality of the gluten is important if its too weak bubbles can burst causing lack of volume, if it's too strong the dough won't stretch enough.
'**Knocking back**' proved dough, the dough is 'knocked back' to remove the large C02 bubbles produced by the yeast. This ensures a more even texture and a better rise. Large bubbles of gas would make large holes in the finished bread.
Baking, the bread dough rises as the C02 produced by fermentation of yeast expands with heat. Yeast activity increases at first, but as the temperature of the dough rises it slows down until eventually the heat will kill the yeast. The water is absorbed by the starch granules in the flour, the starch grains swell and gelatinise this supports the firm structure of the loaf. A gluten network forms a sort of skeleton which traps the C02 gas. During baking the gluten strands are stretched as the C02 gas expands, this together with the coagulation of the gluten protein results in the finished bread structure.

Functions of Bread ingredients

Yeast: Raising agent: Is a living micro organism. When it's the ideal conditions for growth, it respires and produces carbon dioxide. Ideal conditions for growth are: Warmth, moisture, food and time.

Liquid: Moisture: it helps to create the right conditions for the yeast to grow. It also hydrates the flour, helping with gluten formation.

Salt: Structure: helps with gluten formation
Taste: a small amount improves the flavour of the bread.
Too much: will prevent the yeast from fermenting

Flour: Bulk: it gives bulk to the bread.
Taste: Different types of flour affect the flavour.
Absorbs moisture flour can absorb a lot of water to make a dough
Strong flour has a higher protein content so will produce a good quality loaf without it collapsing
Nutrients provides starchy carbohydrates, protein and is fortified with vitamins and minerals.

Other ingredients in bread making
Fat: Lubrication- fat allows the other ingredients to slide over each other so the bread can rise.
Shortening – fat coats the particles of flour and stops it absorbing water, so only a small amount should be used.
Taste: Enhances the flavour.
Shelf Life: fat improves the texture of the bread, keeping it moist and preventing it from going stale quickly.

Other ingredients in bread making
Sugar: Food for the yeast: sugar provides food energy for the yeast so that they can respire and grow.
Browning: sugar turns to caramel when it's cooked and makes the crust brown.
Taste: Sugar adds sweetness to the bread.
Ascorbic Acid: Added mainly in the commercial manufacture of bread, it speeds up time it takes to make the bread.

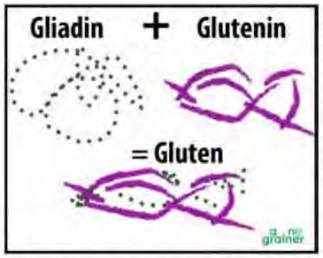
Nutritional Value of Bread:
Bread is a good source of starchy carbohydrate, protein, B vitamins, calcium and iron. Bread which is made with wholemeal flour is also a good source of dietary fibre.

Additional learning and challenge activities
- What does the term 'enriched dough' mean?
- List the key stages for traditional bread making Describe the difference between making bread using the bulk fermentation and the Chorleywood process.
- List the four ideal conditions needed for yeast to respire and produce carbon dioxide.
- Name the gas produced by the fermentation of yeast.
- Why is the formation of the protein gluten important in bread making?
- What does h term 'knocking back' mean and why is it necessary?

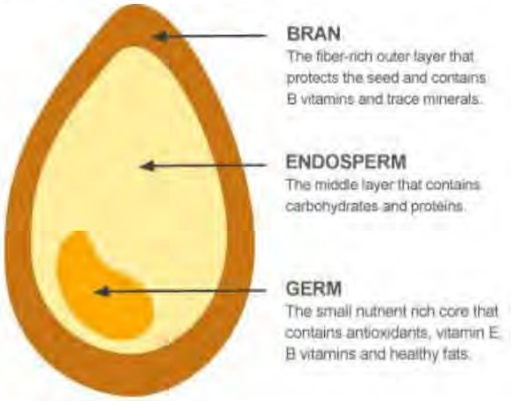
GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Cereals - Wheat

Cereals describe edible grasses that are harvested for their grain. The **endosperm**, the **germ** and the **bran** have importance in cooking, nutrition and food science. The most popular cereals are wheat, rice, maize (corn) oats ad barley. Other cereals such as rye millet, buckwheat, quinoa, sorghum and amaranth are growing in popularity.



Food Science
Wheat flour contains 2 proteins called **gliadin and glutenin**. When moisture such as water or milk is added to the flour **protein gluten** is formed. Strong flour such as bread flour contains a higher percentage of protein than softer flours.
Some food products require more gluten development for **strength and structure** such as in the making of bread, also in puff, flaky and choux pastry. Softer flour should be used in cakes, batters and muffins where gluten development is to be avoided, as strong flours will result in and undesirable tougher and chewy texture.
Effect of heat:
Coagulation, in the case of a dough or cake mix heat will cause the protein present in the flour to coagulate
Gelatinisation: when starch is mixed with water it forms a suspension and with heat, the starch granules absorb moisture and swell. This thickens the mixture, resulting in a GEL .
Dextrinisation: When starch is exposed to dry heat the colour will change to brown. Dextrin causes the characteristic brown crust of baked products and toast.



- **Key points: Starch** is found in the endosperm
- Wholegrain cereals have a higher nutritional value than processed cereals
- Wholegrain cereal is grain left in its natural state.
- The endosperm from wheat provides starch and protein.
- Dietary fibre is found in wheat bran.
- Milling wheat grain into flour is an example or **primary processing**.
- **Secondary processing** of wheat is the making of food products using the flour such as biscuits, sauce, pasta and cakes.
- By law, the nutrients calcium, iron and the B vitamins (niacin and thiamin) must be added to flour, this is known as **fortification.**
- **Wholemeal flour** is made from the whole wheat grain, nothing is removed.
- **White flour** has most of the bran and wheat germ removed.
- Wheat provides energy in the form of starch
- Wheat bran provides dietary fibre and is a source of B vitamins.
- The more you knead dough or beat a mix with wheat flour the more **gluten** will be formed. Ok for bread, not for shortcrust pastry, cakes or shortbread biscuits.
- **Extraction rate:** How much of the original wheat grain is in the flour. 100% means that it is all the grain.
- **NSP**: (non starch polysaccharide) indigestible carbohydrates found in plat food, often called dietary fibre.
- **Phytic acid:** A form of phosphorus which limits absorption of calcium and iron in the body. Wheat stores the mineral phytic acid, it's present in the bran of the grain. The acid will bind with both calcium and iron to form phytates and this then limits the absorption of these minerals in the body.
- **Staple Foods:** Staple foods are usually starchy foods that grow well and can be stored for consumption throughout the year.

Types of flour produced from wheat:
* Wholegrain *Brown *White *Granary *Stoneground *Organic

Nutritional Value of Wheat:
Wheat is a good source or starchy carbohydrate, found in the endosperm. It is also a good source of protein and provides a range of vitamins and minerals. If the wheat still has the bran it will provide dietary fibre in the form of (NSP). B vitamins are found in the bran layers. Flour sold in the UK is fortified with calcium, iron and B vitamins.

Processed wheat grain products:
Wheat Bran: Added to biscuits, cakes , muffins to increase dietary fibre.
Puffed wheat: Flaked, puffed and extruded wheat is used to manufacture breakfast cereals.
Semolina: Mainly used for making pasta.
Couscous: made from semolina grains
Burghul: Also known and bulgur or cracked wheat, key ingredient in tabouli and kibbeh, can be used in soups, burgers and casseroles.

Additional learning and challenge activities
- Ensure you are able to explain the difference between primary and secondary processing
- What does the term 'extraction' rate of flour mean?
- Can you explain the nutritional differences between a food product made with wholemeal flour and one made with white flour?
- You need to know the key nutrients provided in cereals.
- Make sure you can explain how the nutritional value can be affected when cereal is processed.
- Can you discuss the health benefits of a diet containing whole grain cereals?

GCSE Food Preparation & Nutrition – Unit 1 Food Commodities

Pasta

Pasta is a staple food of Italy and together with bread, rice and potatoes, it forms part of the staple food range in the UK. Pasta is usually bought fresh or dried and is available in a variety of shapes, flavours and colours. It can be filled or unfilled and can be served with a variety of sauces. Pasta is **a convenience food** and it is quick to cook, it requires little skill and is cost effective.

Pasta is made from durum wheat; durum wheat has a higher protein content than other wheat varieties. It produces a grainy, yellow coloured semolina on milling. Durum wheat makes good quality pasta because it requires less water to make the dough, making it easier to dry the pasta. Gluten free pasta is available and you can make your own by adding xantham gum into gluten free flour.

Key terms

Convenience food – where some or all the preparation has been done in advance.

Durum wheat – high protein wheat used to make pasta.

Laminating – rolling out pasta into thin sheets.

Dies – machinery attachments used to make special pasta shapes that cannot be made by hand.

Extruded – pasta is forced through a die to achieve a special pasta shape, eg spaghetti and macaroni.

Food Science

Xanthan gum can be used in a gluten free pasta recipe to help give the pasta it's elasticity so it can be rolled through the pasta machine and give it its stability. Xanthan gum is a polysaccharide with a wide variety of uses, including as a common food additive. It is a powerful thickening agent, and also has uses as a stabilizer to prevent ingredients from separating.

Rice flour and potato flour can be used for **gluten free** recipes **Dehydrating** pasta is possible rather than air drying to ensure complete moisture removal to preserve the pasta.

Various ingredients can be added for colour which add to the pasta's **nutritional content**.

Al dente: 'To the tooth' – usually used to describe when pasta is perfectly cooked, with a little 'bite' in the middle.

Starch, should be removed from the pasta by cooking in boiling salted water, this prevents the pasta from being too sticky.

Colouring Pasta:

Spinach: Verdi – Green

Tomato puree: Pomodori - Red

Beetroot: Barbabietola rossa – Purple

Squid ink: Nero - Black

Why is some pasta unsuitable for coeliacs?.

Nutritional Value of Pasta:
Pasta is a good source of starchy carbohydrate, protein and B vitamins. Whole wheat pasta also provides dietary fibre. Pasta is not suitable for a coeliac as it contains wheat flour.

Storage

- Dried pasta can be stored in a cool, dry cupboard and has a long shelf life. Fresh pasta should be kept chilled. Packing should be clearly labelled with details of 'best before' or 'use by' dates and storage instructions.

Additional learning and challenge activities

- **Investigate how to make gluten free pasta**
- **How could xanthan gum help create a gluten free pasta dough?**
- **Create a page investigating the various types of pasta, their names and what they look like.**

GCSE Food Preparation & Nutrition- Unit 1 Food Commodities

Cereals

Many cereals are processed into **breakfast cereals**. The most common cereals are wheat, maize, oats and rice. They are processed in different ways, such as puffed shredded, flaked or rolled. They are often mixed with other ingredients, such as nuts, dried fruit and honey to improve their flavour, texture and nutritional value. Some cereals have sugar added to them, which makes them less healthy.

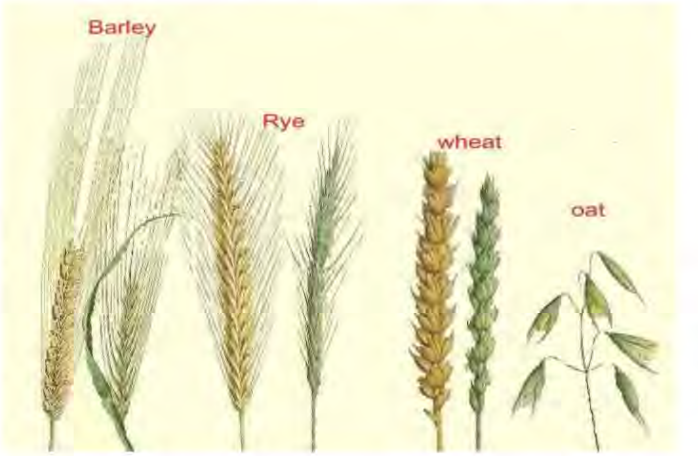
Barley is the second most widely grown crop in the UK after wheat. The most common product is **pearl barley.** It is also used in beer making. It can be used in **sweet & savoury** dishes and also bulks out soups & casseroles. Barley is a good source of **starchy carbohydrate, iron & vitamin B3.**

Oats are a good source of **starchy carbohydrate, protein** and **fat**. They are high in **fibre**. Pure oats do not contain gluten, however a lot of supermarket oats are not pure.

Oats are grown in **cold climates**, such as Scotland. They are **rolled** rather than crushed and are partially cooked during this process. Oats can be **processed** further to make them cook more quickly.

Maize (**corn**) has a similar nutrient content to other cereals and is a good source of starchy carbohydrate. Yellow varieties of corn also contain **carotene**, which is converted to **Vitamin A** in the body.

Rye is mainly grown in Northern Europe. It is **hardy** and likes cold, wet climates. Rye bread has a close, **dense** texture and is often combined with wheat flour so it is not too dense and sticky. Rye flour has a **longer** shelf life than wheat flour due to its' **higher gliadin protein** content. It can also be used to make alcoholic drinks, such as whiskey & beer. It is a good source of starchy carbohydrate, fibre, minerals and vitamin B1 (**thiamin**).



Other grains:

Sorghum; cereal grain grown in Asia & Africa. Milled into a soft, fine flour to make flat breads and has a nutty taste.

Quinoa; pronouced 'keen- wah', is often called a superfood. It is a good source of protein- providing all the essential amino acids and is a HBV protein. It is gluten free, cholesterol free and also wholegrain so has plenty of fibre too. There are red, black and white quinoa and they are cooked similar to rice/ barley.

Arrowroot; comes from the maranta plant and is used to thicken sauces. Can also be used as a glaze for fruits in the form of a smooth, clear gel.

Sago; comes from sago palm and is used for milky puddings.

Tapioca; comes from a tuber called cassava and is also used for milky puddings as well as a thickener in soups & stews.

Key words

- **Humid:** damp, warm environment. Not a good environment for cereals to be stored in; they need to be cool & dry.
- **Best before date:** When cereals should be consumed by.
- **Maize:** sometimes called **corn**. Staple food grown in South America, Asia & Africa.
- **Masa harina:** finely ground corn flour treated with slaked lime; main ingredient in corn tortillas.
- **Beta- glucan:** found in oats; lowers blood cholesterol.
- **Coeliac disease:** an auto immune condition where a person has an adverse reaction to gluten.

Additional learning and challenge activities

- Do a poll to find out which breakfast cereals your class mates eat; which are the most popular? Why do you think this is? Discuss the advantages & disadvantages of the most popular cereals; are they healthy?
- Research the name of the deficiency disease caused by lack of niacin (vitamin B3) where maize (corn) is used as a staple food.
- Can you explain the difference between soluble and insoluble fibre?
- Get a map of the world and colour code where each crop is grown/ produced.
- Research into the most likely contaminants that can affect the quality of the cereal crops and how they can be prevented.
- Create a dish using one of the cereals listed on this page!

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Rice

Rice is the most widely consumed staple food for a large part of the worlds human population, especially in asia. Rice grows well in hot and humid conditions in flooded fields called paddiea. Rice is processed in a similar way to wheat. It is cost effective and versatile, it has a long shelf life as it's a dried food . Storage should be in a cool dry area (usually in a kitchen cupboard)

Growing and processing:
Many different types of rice are grown and used in cooking. In order to grow rice the land is firstly ploughed to 'till' or dig up, mix and level the soil. In most Asian countries the ancestral methods for cultivating and harvesting are still practised. The fields are often ploughed using water buffalo. Rice seedlings are planted by hand in the fields which have been flooded by rain or river water.

Key terms
Brown rice contains bran. White rice has the bran removed.
Cooked long grain rice should be fluffy and individual grains will be visible.

Cooked short grain rice will be stickier and starchier.
Rice can be made into many different products including wine, vinegar, milk and noodles.

Beri Beri a muscle wasting disease occurring in places where white rice is a staple food. The diet is deficient in thiamine (vitamin B1)

Secondary Processing of rice:
This is when rice is processed into other products such as:

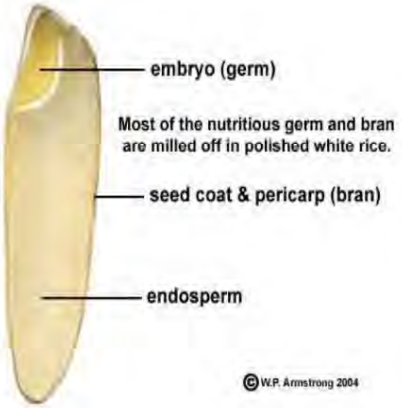
Rice bran, rice bran oil, rice milk, rice vinegar, rice flour, rice wine, rice cakes, rice noodles, rice starch, rice tea and rice wine.

Why is rice associated with food poisoning? What are rice spores?

Nutritional Value of Rice
Rice is about 90% carbohydrate. 8% protein and 2% fat. It is a good source of iron and B vitamins. It is low in fibre.
Brown Rice is wholegrain. It is about 85% carbohydrate, 8% protein and 7% fat. And contains as much as four times the amount of fibre and more minerals than white rice. It is a good sources of B vitamins.

Types of Rice
Long grain:
Brown long grain rice (whole grain rice) – nutty flavour, nutritionally complete, higher vitamin, fibre and mineral content. Chewy texture and takes longer to cook.
White long grain rice – cooks quickly and is white in colour
Basmati rice – fragrant flavour, can be white or brown. The preferred rice for Indian cuisine.
Jasmine Rice (Thai fragrant rice) – Aromatic like Thai food, soft and sticky texture when cooked.
Wild rice – An aquatic wild grass. Takes a long time to cook, nutty flavour, nice texture and dark in colour. Usually sold as a mixture of rice.

Short Grain Rice:
Arborio Rice – an Italian variety which is used to make risotto
Pudding Rice
Glutinous rice – when cooked properly this rice is very sticky, used in various Asian cuisine.
Sushi Rice – higher ratio of the starch amylopectin compared to the starch amylose. This makes this rice much stickier when cooked.



Additional learning and challenge activities
- Give 5 examples of products obtained from secondary processing of rice.
- For each one suggest one way that it can be used in cooking.
- Ensure you know the various rice varieties and dishes that can be made using these types of rice.
- What is the difference between white and brow rice?

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Fruit and Vegetables

Potatoes: A staple food in the UK.The part of the potato we eat is called the Tuber.
They come in a variety of colours but we are most familiar with the red and white varieties.
The most common potatoes we eat in the UK are Maris Piper, King Edwards and Desiree.
Sweet potatoes are also popular and are a common alternative to traditional potatoes.

Different varieties of potatoes have different textures. Some can be floury, sticky and waxy or granular.This is due to the potato cell changing during cooking.
All potatoes have the same structure. The outer layer is the skin, the fesh is the area under the skin. The pitch is the watery core.
They can be cooked in a variety of ways including, boiling, roasting, baking and frying.Good source of vitamin C , complex carbohydrates (starch) and a small amount of B vitamins.
They also contain water.

Storage of potatoes
Stored in cool, dry and dark places
Such as hessian bags, racks or paper bags
Left in the light they will turn green - the green part is toxic
Not in plastic bags as they will sweat and rot
Storing in the fridge can affect the taste and cause discolouration

We are encouraged to eat a wide variety. Eaten as part of a main meal or a snack. Can be eaten raw. Cooking destroys some of the nutritional value. The eatwell guide suggests a third of our diet is made up of fruits and vegetables. They are a good source of carbohydrates, fibre vitamins and minerals and are low fat.

Vegetables are categorised according to the part of the plant they represent. They can be grown above or below the ground.

Group	Examples	Above or below
Roots	Beetroot, Carrots, swede	Below
Bulbs	Onions, leeks, spring onions	Below
Tubers	Potatoes, sweet potatoes, yams	Below
Stems	Asparagus, celery	Above
Leaves	Cabbage,brussel sprouts	Above
Flowers	Cauliflower, broccoli	Above
Fruits and seeds	Peas, courgettes, aubergine	Above
Fungi	mushrooms	Above

Vegetable Structure
The structure of vegetables is a collection of cells made of cellulose. The type of vegetable and its age can mean that the structure varies. Vegetable cells contain high amounts of water and this keeps the vegetable form (e.g. cucumber 70% water) . If they start to lose water the cells lose their firmness and they become limp and flabby.

Vegetable Storage
Salad and some green vegetables can be stored in the fridge to keep them fresh
Most other vegetables should be stored in cool, dry, well ventilated areas.
Most vegetables should be eaten as soon as they are purchased to avoid nutrient and flayour loses.

Ripened fruits are more attractive to eat. They will change in colour, texture and taste (sweeter) when they ripen.

Fruit
There is a vast array of fruits available to eat in the UK. These may be home grown or imported. Many fruits are seasonal (the times of the year when the food is at its peak, in terms of harvest, flavour or cost)

There are four main groups of fruit.Some fruits (bananas, pineapple, mango) do not fit into any of the categories and tend to be sold as exctic or tropical fruits.

Group	Examples	Storage
Citrus	Oranges, lemons, limes, grapefruits	Cool, dry place
Hard	Apples, pears	Room temperture, do not refridgerate
Soft or Berry	Strawberries, raspberries, blackberries	fridge
Stone	Plums, cherries,peaches	Fridge. Room temperature for faster rippening.

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Milk, Cheese and Yoghurt

MILK

Cow's milk is the dominant milk drank in the uk. Alternative include goats milk and soya milk.

Milk contains bacteria - it must be heated to destroy the bacteria - to make it safe to drink. This makes it last longer too.Milk can be pasteurised.HTST - High temperature short time. Heated to 72 degrees for 15 seconds. Then cooled rapidly and bottled.UHT - ultra heat treatment - heated for 1 second to 132 degrees. Makes milk sterile (no bateria). Rapidly cooled and packaged. Lasts longer than pasteurised milk.

Type	Details
Whole	3.9 % full fat. Blue cap. Recommended for children
Semi-skimmed	1.7% fat. Half fat. Green cap
skimmed	0.1-0.3% fat. Red cap
Evaporated	Concentrated, sterilised and canned. Reduced liquid content - thicker
Condensed	As condensed but with sugar added - helps to preserve the milk
Dried milk powder	Water removed to dry. Water added then can be used and stored as fresh milk
Alternative	Dairy free - soya, almond, oat and rice

Complete food - provides many nutrients - the only food needed for babies (all mammals) for the first few weeks of life.

Protein - HBV
Fat - Saturated
Carbohydrate - simple - lacoste - sugar in milk
Minerals - calcium, phosphorus, potassium and iron
Vitamins - A, D and B some C
Water - high volume content.

Storage
Perishable - refrigerated and away from strong smelling foods.

Cheese can be described as solid or semi-solid (soft cheese\) milk. Can be referred to as fermented dairy food.

CHEESE

Type	Examples
Hard pressed	Cheddar, leicester
Soft (or ripened)	Camembert, brie, goats
unrippeded	Cottage cheese, cream cheese, mascarpone
Blue veined	Stilton, danish blue
processed	cheese slices and spreads

Protein - HBV
Fat - Saturated. High content depending on milk used
Minerals - calcium, phosphorus, sodium
Vitamins - A, D and B some C

Uses: flavour, colour, texture and increased nutritional value

Storage
Refrigerate between 0-5 degrees. Soft cheese use within a few days. Hard cheese last longer. Airtight box - prevents drying out

YOGHURT

Protein - HBV
Fat - Saturated. High content depending on milk used
Minerals - calcium, phosphorus, sodium
Vitamins - A, D and B some C

The bacteria convert the lactose (milk sugar) to lactic acid, which thickens the milk and gives it the tangy taste characteristic of yogurt. The yogurt is then cooled and can be flavoured with fruit, sugar, other sweeteners or flavourings. Stabilizers, such as gelatin, may also be added

Yighurt is made from different types of milk. Some yoghurts contain other ingredienmts to flavour them sich as sugar and fruit.
Set yogjhurt - firm texture - set in pot it is served in
Love yoghurt - fermented with live culture bacteria - still living
]greek (strained) yoghurt - cows or ewes milk- thick and high in fayt.

Storage
Refrigerate between 0-5 degrees. Eat within use by date.

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

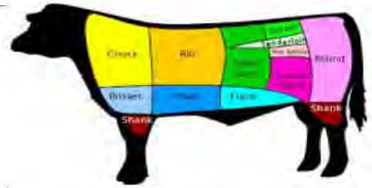
Milk, Cheese and Yoghurt

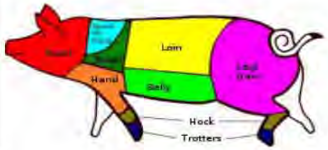
MEAT

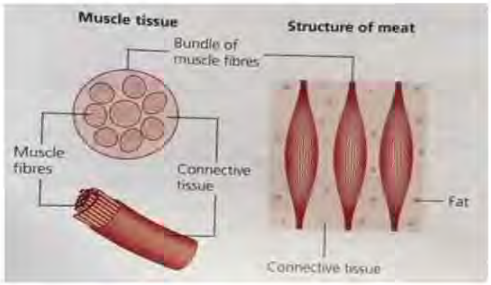
There are 3 animals we generally eat in the uK - pigs, sheep and cows.

Meat is made up of protein, water and fat.
Fat in meat is either visible (seen around the edge) or invisible (in the connective tissue)

Beef, veal	**Steaks** - sirloin, fillet, rump **Joints** - topside, brisket, silverside **Cuts** - skirt, chuck, minced
Lamb, mutton	**Steaks** - shoulder, fillet, **Joints** - leg, saddle, neck **Cuts** - chump, loin., noisettes, minced
Pork, bacon, gammon and ham	**Steaks** -shoulder, loin **Joints** - spare rib, leg, shoulder, loin **Cuts** - belly, chops







Protein - HBV
Fat - Saturated
Minerals - iron
Vitamins - (fat soluble) A, D and B
Water - high volume content.

Cooked for: kill bacteria, flavour, to make tender, to make more appealing, to make nutrients more digestible

Storage
Meat is a high risk food, it must be cooked and stored correctly to avoid food poisoning. Raw meat should be refrigerated, cooked meat covered and refrigerated

Raw meat = muscle + connective tissue + fat.

The muscles are bundles of fibre which are surround and held together with connective tissue. These muscle fibres can be different lengths depending on the part of the animal they are from.part of the animal that does a lot of work such as the leg have longer fibres and can be tougher. Cooking is used to make the meat tender. The fibres contain water and mineral salts.

Digestible - some foods are broken down more easily by the body (by the action of enzymes)than others. Meat needs to be cooked to make it more digestible. They are broken down into macronutrients and micronutrients and absorbed through the wall of the intestines.

FISH

Fish is made up of protein, water, minerals and fat.

Type	Examples
White fish	Sole, halibut, trout, tuna
oily	Mackerel, salmon, trout
shellfish	Crabs, lobster, prawns

Fish Flesh = muscle + connective tissue.
Fish muscle has short fibres and the connective tissue is very thin, this means that fish can be cooked quickly and still be tender and moist.
Cuts - whole, fillet, goujons, steaks

High in Protein - HBV
Low in Fat , good source of fatty acids
Minerals - calcium if bones are eaten - sardines
Vitamins - A, D
Shellfish can be high in cholesterol

Storage
Spoil quickly - eat same day or quickly afetr - can be unsafe to eat after longer
Refrigerate between 0-5 degrees.

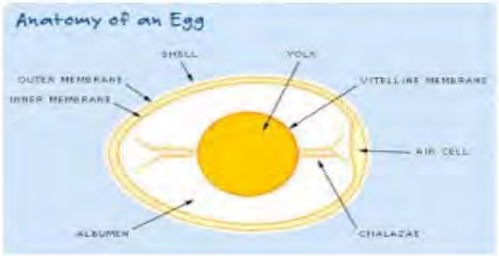
GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Milk, Cheese and Yoghurt

EGGS

Eggs are produced by hens, ducks, quails and geese. The most popular are hen (chicken) eggs.

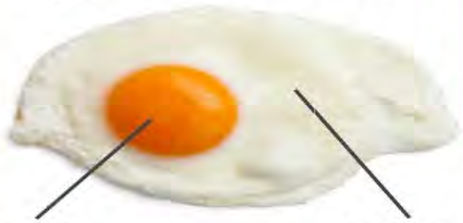
Eggs can be brought in 4 different sizes; small, medium, large and extra large.



Structure:
10% shell, 30% yolk, 60% white

Storage
Away from strong smelling foods as they are porous (contains tiny holes) and will absorb strong odours. Consume by usebydate.

Egg Nutrition



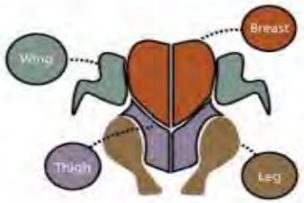
Cooked by: boiling, frying, poaching, scrambling

Yolk		White	
Fat	**4.5 g**	Fat	0 g
Sat. Fat	**1.6 g**	Sat. Fat	0 g
Cholesterol	**184 mg**	Cholesterol	0 mg
Carbohydrates	0.5 g	Carbohydrates	0 g
Protein	2.5 g	**Protein**	**4 g**

Protein - HBV white and yolk
Fat - Saturated in the yolk
Minerals - iron
Vitamins - (fat soluble) A, D and E in yolk. B in the egg white.
Water - in white and yolk.

BEST → WORST

Label	Pasture Raised	Certified Organic	Free Range	Cage Free	Conventional
Living Space	Natural fields or pasture, most space for natural behaviors	Aviaries/barns without cages, space varies, buy local when possible	Aviaries/barns without cages but very crowded	Aviaries/barns without cages but very crowded	Grouped in small cages with little room to move
Outdoor Access	Live outside with access to barn	Required but not regulated	Limited and not regulated	None	None
Diet & Feed	Natural foraging, feed varies from farm to farm	Organic vegetarian, pesticide-free and non-GMO	Typical chicken feed	Typical chicken feed	Grain-based, fortified, basic needs met in cheapest way possible
Hormones & Antibiotics	Less common, less necessary	None	Common practice	Common practice	Common practice
Nutritional Value of Eggs	Most nutritious	More nutritious than conventional	Similar to conventional	Similar to conventional	Least nutritious



POULTRY

Chicken is the most popular poultry used in the uk. There is also duck, turkey, goose, guinea fowl and pigeon.

Chicken	Most popular, large bird, sold whole or jointed into legs, wings, breast and legs.
Turkey	Similar to chicken but larger. Associated with christmas
Duck and goose	Richer tasting birds, fatty in comparsion

Poultry = muscle + connective tissue.

Breast is softer than the legs that can be tough (hardest working part of the bird) older birds are tougher than younger birds which tend to be tender. Nutritional value varies according to the age of the bird, how it is reared and the parts eaten.

High in Protein - HBV
Lower in Fat than meat , saturated
Minerals - calcium if bones are eaten - sardines
Vitamins - good source of B, some A and D

Storage
High risk food, it must be cooked and stored correctly to avoid food poisoning. Should be refrigerated, thawed and cooked thoroughly to kill bacteria.

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Milk, Cheese and Yoghurt

Soya and Tofu

Soya comes from the soya bean pod. Part of the legume family. Beans, peas and lentils are also part of this family.

Soya can be processed into many different forms - milk, sauce, paste, flour tempeh. It can be bought dried, canned or fresh in the form of desserts, yoghurts and margarines.
Contains Fibre, HBV protein and magnesium.

Tofu can be called bean curd. Made from fresh soya milk, that has been curdled and pressed into a block and then cooled.

It is made in the same way as traditional cheese.

Bland tasting so needs to be favoured.

Contains HBV protein, iron, calcium and other minerals. Some B vitamins.

They are both bought in sealed containers and should be stored in the fridge.

Nuts

- Some nuts are edible kernels from which the fruit wall has been removed. Some are seeds and some are pulses.
- Nuts are used in savoury and sweet dishes
- Nuts can cause allergic reactions
- Nuts can be bought in many forms , shelled, ground, chopped, whole
- Nuts have high energy values due to the high fat content
- They provide LBV protein
- They contain B vitamins
- They provide fibre
- Need to be stored in airtight containers or will turn rancid due to the high levels of oil
- Kept away from moisture and strong odours
- Consume before use by date.

Beans

Beans are legumes, normally referred to as pulses. Pulses are edible seeds that grow in a pod.

Most popular bean is the baked bean - a haricot bean in tomato sauce. Beans are added to dishes for bulk, flavour or to nadd to the nutritional value.

High in protein and fibre , some carbohydrates, calcium and B vitamins.

bean	storage
fresh	fridge
frozen	freezer
dried	Airtight, cool dry place
canned	cool dry place

Seeds

- Include poppy, pumpkin and sunflower
- Used as a healthy snack
- Used as topping on food
- Roasted or toasted to add texture and flavour
- Ground to add flavour
- Used to manufacture oil
- Provide protein
- Provide essential fatty acids
- Provide iron and zinc
- Vitamins B and E
- Need to be stored in air tight containers in a cool dry place.

GCSE Food Preparation & Nutrition - Unit 1 Food Commodities

Butters,Oils, Sugars and Syrup

Butters

Butter is the dairy product made from churning milk or cream. The churning process separates the butterfat (the solids) from the buttermilk (the liquid). The **butter** we most often buy is made from cow's milk, although other varieties — made from the milk of sheep, goat, yak, or buffalo — are also available.Butter comes in salted and unsalted varieties.

Uses:
Melting - pouring over vegetables
Spreading - crackers and sandwiches to avoid moisture
Creaming - making cakes
Shallowing frying - eggs
Shortening - rubbing in to make pastry

Nutrients:
High in fat
Vitamins A and D
Sodium - salt

Storage:
Kept in fridge
Away from strong odours
Fully covered or can go rancid if left open to the air.

Oils

Oils are liquid at room temperature. They are lighter than solid fat such as butter and easier to digest.

Vegetable oils are natural oils found in seeds, nuts and fruit. Examples include sunflower oil, sesame oil, rapeseed oil and olive oil. Oils are used for frying, basting, marinating and dressings. The main nutrient found in oils is fat, this is an unsaturated fat and considered healthier than saturated fats. Oils should be stored in cool, dry places.

Margarine

Margarine was introduced as an inexpensive alternative to butter. It was made from vegetable oils and is **fortified with vitamins A and D**.
Margarine is sold in solid block or as a soft margarine in a tub.

Uses:
Block margarine is used for baking. Soft margarine is used for baking and frying and for spreading when making sandwiches.
Some soft margarines have a very low fat content so no suitable for making cakes, pastries and biscuits. High in fat. Provide vitamins A and D, water and minerals such as sodium (salt).

Sugars

- Comes from sugar cane (a tall grass grown in hot climates)or sugar beet (a root crop similar to parsnip grown in climates with warm and cold seasons)
- Pure carbohydrate - give quick release energy. Provides empty calories as does not provide other nutrients
- Primary function in cooking is to provide sweetness. Can provide colour and crunch to some dishes

Type	Description	Uses
granulated	White, coarse, small crystals	Sweetening- drinks, cereals,
caster	White, made from ground granulated sugar, finer crystals	Cake making - victoria sandwich cake
icing	White, made from ground granulated sugar, fine powder	Decorating - cakes, making icing
demerara	Pale brown, made from raw sugar,larger coarse crystals than granulated sugar	Adding crunch - flapjacks
Soft brown	Small sugar crystals containing molasses, a dark syrup.	Flavour in cakes - christmas cake

Syrups

Golden syrup is the most familiar
Bought in various forms - jar - can- squeezy bottle. Very sweet.
Black treacle is also a syrup, much darker in colour and thicker with a stronger flavour
Black treacle is used for making christmas cake, gingerbread and some curry sauces.
Best stored in cool, dry places and used within three months of opening

Golden syrup or light treacle is a thick, amber-coloured form of inverted sugar syrup made in the process of refining sugar cane or sugar beet juice into sugar, or by treatment of a sugar solution with acid.It is essentially white sugar/sucrose in a different form. This has been inverted, meaning that the sucrose has been broken down into two simpler sugars, fructose and glucose. The fructose content gives a heightened perception of sweetness so that, 25% less golden syrup can be used than granulated white sugar.

A British tablespoon of golden syrup contains about 60 calories, whereas a British tablespoon of white sugar is about 50 calories. By volume, golden syrup has more calories: by weight sugar has more calories.Golden syrup and white sugar have a very similar glycaemic value, meaning that the body processes both at about the same rate.

Food Preparation and Nutrition Topic: Section 2: Principles of Nutrition

Macronutrients

Macronutrients are needed in **large amounts** to make the body 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.

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 or complex.

Source

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

Complex - these are starches (polysaccharides)
Bread, potatoes

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

Food Preparation and Nutrition
Topic: Section 2: Principles of Nutrition

Micronutrients

Micronutrients are needed in **small amounts** to make the body function properly.

Vitamins

They all have different functions, but generally
- Help the body release energy
- Prevent some diseases
- Keep the body healthy
- Repair cells

Fat soluble vitamins: vitamin A, and vitamin D

- Don't need to be eaten every day as the body can store them in the liver and fatty tissues.
- Too many in our diet can cause us harm

Water soluble vitamins: B vitamins: vitamin C

- Not stored in the body so need to be eaten
- To maximise the intake and prevent loss, steam instead of boil the food, or use the water in gravy
- Excess vitamins are eliminated in the urine

	Source	Function	Deficiency
B1 Thiamin	Bread / Pasta / rice / peas / eggs / liver	Energy release	Tiredness
B2 Riboflavin	Milk / eggs / leafy greens	Energy release / repair	Tiredness / dry skin
B3 Niacin	Wheat / nuts / meat / fish	Energy release / skin	Tiredness
B9 Folic Acid	Liver / peas / leafy greens	Growth / healthy babies / red blood cells	Anaemia / tiredness
B12 Cobalamin	Milk / eggs / meat / fish	Red blood cells	Tiredness / nerve damage
C	Citrus / tomatoes / green veg	Immune system / absorbs iron	

Minerals

Minerals help chemical reactions in our body.

	Source	Function	Deficiency
Calcium	Dairy, green leafy veg, bread	Strong bones	Weak bones, rickets and osteoporosis
Iron	Meat, green leafy veg	Red bold cells	Anaemia
Potassium	Fruit and veg	Heart health	Bad for your heart
Magnesium	Green leafy veg	Release energy and bone health	Nausea

Water

Keeps us hydrated.

Source

Drinks, fruit and vegetables, soup.

Function

- Normal physical and cognitive functions,
- Normal regulation of the body's temperature.
- Gets rid of waste substances in the body.

Deficiency

- Even mild dehydration can lead to headaches, irritability and loss of concentration.
- Groups at risk include children, old people and active people.

Trace Elements

Trace elements help chemical reactions in our body.

	Source	Function	Deficiency
Fluoride	Fish, toothpaste	Strengthens teeth	Weak teeth
Iodine	Seafood and dairy	Hormone development	Complications in unborn babies

Fibre

Fibre is also known as "roughage" or "non-soluble polysaccharides (NSP)".

Insoluble fibre

Source

Wholegrain, whole wheat and wholemeal cereals

Function

- Insoluble fibre goes through the body and collects rubbish and waste before pushing it out as poo.
- This acts like a sponge by expanding to hold water and waste
- Helps keep poo soft
- Prevents constipation

Soluble Fibre

Source

Peas, beans, lentils, apples and citrus fruit

Function

- Lowers cholesterol, helping reduce the risk of heart disease.
- Helps to control the level of blood sugar by slowing down the release of food from the stomach (good for diabetics

Deficiency

Constipation, bowel cancer

RDA

30g per day

Food Preparation and Nutrition:
Section 3: Diet and good Health

We use the eatwell guide to get a balance of healthier and more sustainable food. It shows how much we should eat from each group.

1. Base your meals on starchy food

Most of the food on your plate should consist of starchy foods

These supply important energy and give important minerals and dietary fibre.

Whole grain and whole wheat versions are best

How?

Have a side of starchy food like potato, rice, pasta or bread.

2. Eat lots of fruit and veg

We should eat at least five a day.

How?

Choose from fresh, frozen, tinned, dried or juiced.

Add vegetables to meals
Add vegetables or fruit to cakes and desserts

3. Eat more fish

Fish is a good source of protein, contains vitamins, minerals and omega 3.

How?
Aim for at least two portions of fish a week

4. Eat less saturated fat and sugar

Too much fat is bad for you and causes dietary health problems disease, obesity, stroke)

How?

- Cut visible fat from the meat
- Choose lean cuts of meat
- Offer low fat spreads

Too much sugar caused type 2 diabetes, heart disease, obesity and dental problems (heart

How?

- Use sugar substitutes for puddings, cakes and biscuits
- Offer fresh fruit alternatives
- Use less processed foods – especially sauces

5. Eat less salt

Eat no mare than 5g a day.

Too much salt causes high blood pressure, strokes and dehydration

It is highly addictive!

How?

- Cook dishes using fresh ingredients
- Don't add salt at the table
- Don't add salt to the cooking water

6. Get active

If you eat more energy than your body needs, it is turned into fat. If you don't eat enough energy your body cannot function properly.

Being overweight can lead to heart disease, high blood pressure or diabetes.

Being underweight also affects your health and leads to bulimia or anorexia.

How?

- Only eat as much food as you need
- Exercise for 30 minutes a few times a week.

7. Drink plenty of water

Our bodies are 2/3s water. It is vital to drink enough water to stay hydrated.

Even mild dehydration can lead to headaches, irritability and loss of concentration.

How?

- Drink loads of water
- Fruit, soup and other drinks also count

8. Eat breakfast

Breakfast is the most important meal of the day as it gives energy for the day..

It should be made up of complex carbohydrates for a slow release of energy and stop us snacking.

We also follow the 8 government healthy eating guidelines:

Food Preparation and Nutrition:
Section 3: Diet and good health: Nutritional Needs

Life Stages

Toddlers

Eatwell guide doesn't apply
High calcium
Small meals
Variety of different fooods

Young Children

- Protein for growth and development
- Given small, attractive portions of food
- Introduce to new foods gradually
- Avoid fatty and sugary food
- Calcium and Vit. D for bones and teeth

Teenagers

- Should be given protein for growth and development
- Risk of obesity and poor skin - Eat 5-a-day to help Good supply of iron (esp. for girls during period)
- Avoid fatty or sugary food
- Try to develop good habits

Early and middle Adulthood

Follow eatwell guide
Men need more calories
Women need more iron
Calcium and vitamin for strong bones

Elderly

- Should be given protein to repair worn out body cells
- Need a good supply of calcium and vitamin D for healthy bones
- Good supply of iron to keep the body healthy
- Need more fat in the winter to stay warm
- Fresh fruit and vegetables for vitamins and minerals
- May struggle to cut (arthritis) or chew food (false teeth) and digestive problems.

Special Dietary Needs

Allergy: an adverse reaction by the body to certain substances

Intolerance: 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

Type 2 Diabetes	Starchy food/high in sugar
Low fat diet	Foods naturally high in fat Foods cooked in a lot of fat
Low salt diet	Processed food Smoked meat Chinese food with MSG
Nut allergy	Avoid nuts, blended cooking oil, margarine with nut oils and often seeds
Lactose intolerance	Avoid milk, cheese, yogurt, processed food
Gluten intolerance (coeliac)	Avoid Wheat, wholemeal, bran, pasta, rye, beer.
Iron deficiency anaemia	High iron food – red meat, dark green leafy vegetables
Calcium deficiency	High calcium food – dairy High Vit. D food – tuna, salmon
Dental Caries	Limit sugary food
Cardiovascular disease and obesity	Correct portion size Reduce Saturated fats Fruit and veg to replace fatty food

Specific Lifestyle Choices

Religious/cultural

Muslims

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

Hindus

- Do not eat beef (a cow is considered sacred)
- Many are vegan, although some do eat meat

Jews

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

Vegetarians - Ethical or moral choices

- Dishes with vegetables generally healthy
- Need protein from other sources
- Risk of iron, B1, B9 and B12 deficiency
- Protein from Quorn/tofu

	Eat	Avoid
Pescatarian	Fish/animal products (eggs and dairy)	Meat
Lacto-ovo vegetarian	Animal products (eggs and dairy)	Meat, fish
Lacto-vegetarian	Dairy	Meat, eggs, fish
Vegan		Animal products

Physical Activity

People may have high energy needs if they are physically active, such as sports people or people who are on their feet a lot.

GCSE Food Preparation and Nutrition
Section 4: The Science of Food

Bacteria

What are bacteria?
A micro organism that multiply in certain conditions.

Where can bacteria be found?
Everywhere!

Are all bacteria bad?
No- some are good and essential for normal bodily function.

How can you reduce the risk of bacteria?
- Storing food separately
- Storing and cooking foods at the correct temperatures

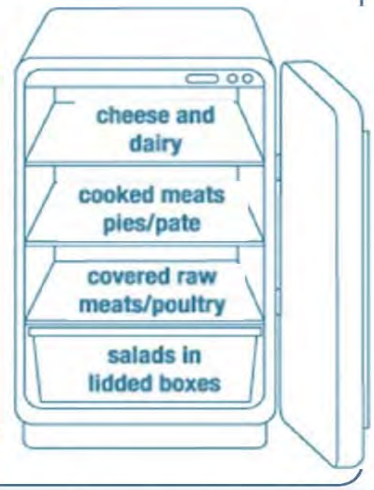
Can we kill bacteria by putting them in the fridge?
No- but keeping food chilled at the correct temperatures will slow bacterial growth.

Storing Food

Temperature is really important to keep food safe. The following temperatures should be used:

Refrigeration	°C
Freezing	Freezing of food at -18°C or below will stop bacteria multiplying.
Cooking	Temperatures of 72 °C or above kills almost all types of bacteria.
Danger Zone	The temperature range where bacteria is most likely to reproduce: 8°C-63°C.

To prevent cross contamination (the spreading of bacteria), foods must be stored separately. Follow the rules of food storage within a fridge:



The 4 C's

Cleaning - wash your hands properly

Cooking - make sure you cook food properly or you could make someone very ill

Chilling - keep it chilly silly

Cross contamination - keep raw meat and cooked food apart

What do bacteria need to multiply?

Water: bacteria need moisture to

Temperature: bacteria grows when warm

Food: provides the energy for bacteria to grow, multiply and produce toxins

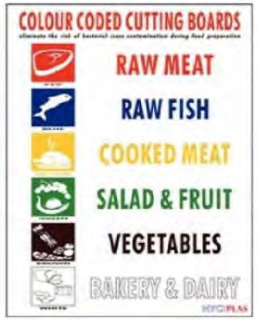
Time: if food is exposed to these things for a long time they will quickly multiply

Cross Contamination

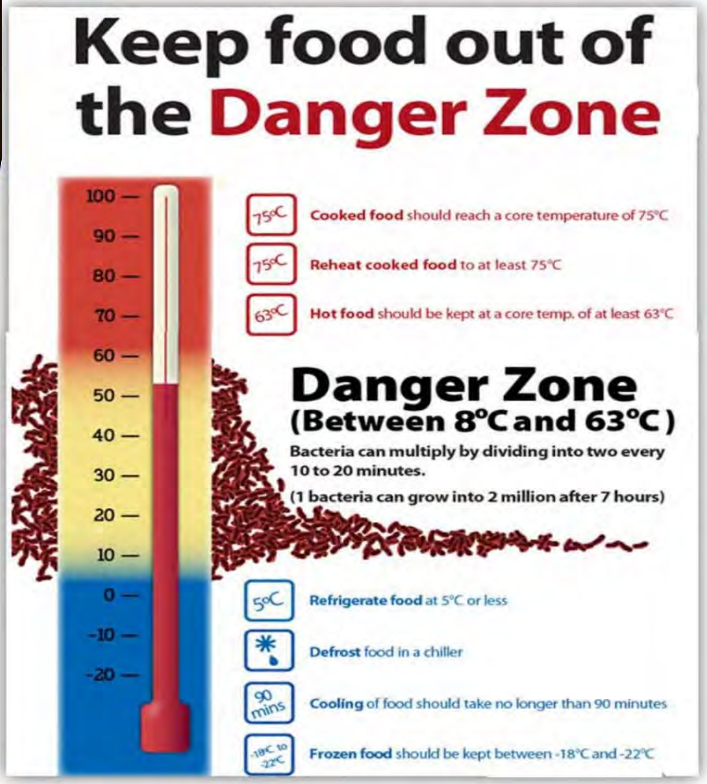
What is cross contamination?
Cross contamination is spreading bacteria from one place to another.

What are the four C's to help prevent spreading bacteria?
- Clean
- Cook
- Chilling
- Cross contamination

Why do we use different coloured chopping boards when preparing food?
To prevent the spreading of bacteria (to avoid cross contamination).



Keep food out of the Danger Zone



GCSE Food Preparation and Nutrition
Section 4: The Science of Food

Sources of contamination:

Food can get contaminated in a number of ways.

Name	Natural contamination	Additional contamination	Prevention
Biological 	Food poisoning bacteria	Bacteria from another source	Store food properly Cook food properly No cross contamination Clean hands
Chem 	Chemical - poison, or pesticides	From cleaning chemicals,	Store your cleaning chemicals away from food Always label chemicals Always wash fruit and vegetables
Physical 	Bones	Foreign objects (hair, plasters, flies, screws	Tie your hair up Remove jewellery Wear blue plasters

Signs of Spoilage

Discolouration - Change in colour

Change in texture - Slimy, wrinkly, lumpy, hard

Visible mould

Smell - Sour, bitter or sharp

Change in flavour - Sour, rancid, acidic

Positive use of Microorganisms:

1. Mould is added to blue cheese
2. Yeast is used to make bread
3. Bacteria is used to make yoghurt

Food Preservation:

Food need to be preserved in a way that reduces the bacterial growth, moulds or spoilage.

Controlling temperature
Removing moisture/air
Changing pH
High cooking temperature

Why Bother?

Prevents food poisoning
Reduces food waste
Saves money
Helps planet

Methods of Preservation:

1. Freezing: Freeze foods to slow growth/make organisms dormant. e.g. meat
2. Chilling: Keeping food in the fridge or a chiller cabinet slows down growth of microorganisms. e.g. meat
3. Jam Making provides a sugary medium which inhibits growth of bacteria and mould e.g. strawberries
4. Pickling: alters the pH levels inhibiting growth of bacteria and moulds e.g. onions
5. Salting: the salt draws moisture from the food which therefore prevents/inhibits growth of bacteria and moulds e.g. fish
6. Canning: food contents are processed and sealed in an airtight container. e.g. fruit

Methods of cooking food

Method	How	Example	Advantage	Disadvantage
Moist heat method				
Boiling	Starchy food boiled vigorously	Potatoes	Healthy (no extra fat)	Water soluble vitamins lost
Poaching	Food gently cooked in a small amount of liquid	Meat, fish or eggs	Healthy (no extra fat)	Water soluble vitamins lost
Steaming	Food cooked in the steam of boiling water	Vegetables, fish	Healthy (no extra fat) Water soluble vitamins kept	Takes a long time
Dry Heat Method				
Baking	Dry, hot air of oven	Cakes, bread	Good colour and texture, Many products cooked at once	Specific times and temperatures needed
Roasting	Dry, hot air of oven. Food is basted to stop it drying out	Joints of meat, vegetables	Flavour and texture, multiple products at the same time	Takes a long time, food can dry out
Grilling	Small pieces of food cooked by radiant heat	Sausages, bacon	Healthy (fat drips out of meat)	Needs supervision, easy to under/overcook
Frying Method				
Shallow frying	Small items cooked with a little fat	Chicken, vegetables, sausages	Quick method, minimal fat added	Not very healthy, needs constant supervision
Deep Frying	Food submerged in hot oil	Chips, chicken, fish	Golden colour and crunchy texture Quick and versatile	Very unhealthy Needs supervision dangerous
Stir frying	Food kept moving in small amount of oil	Thin strips of meat, vegetables	Quick, limited vitamin loss	Lots of prep needed, constant supervision

Section 4: The Science of Food

Why food is cooked:

1. To make it safe to eat
2. To improve the shelf life
3. To develop flavour
4. To improve texture
5. To give variety

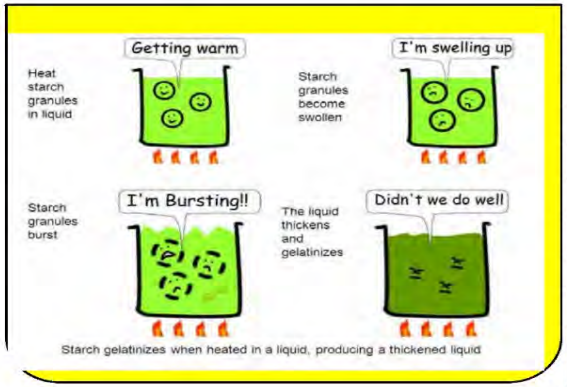
Methods of heat transfer

Convection - when the environment (air, water or oil) is heated up.
e.g. - baking a cake
- boiling an egg

Conduction - when heat is transferred directly.
e.g. - frying an egg

Radiation - when heat radiates
e.g. - toast

Gelatinization



Why do things go wrong?	
Problem	**Result**
Too much flour	Stodgy, dry and stiff
Too little flour	Lacks bulk, volume and too soft or runny
Too much fat	Greasy and rubbery or crunchy
Too little fat	Dry, lack of flavour
Too much sugar	Too brown and sweet, crisp, brittle
Too little sugar	Affects flavour, dry, no volume
Too much egg	Eggy flavour, like and omelette, dense texture
Too little egg	Poor coagulation
Too much liquid	Wrong consistency
Too little liquid	Dry mixtures
Too much raising agent	Cracked cake surface, cake spilling
Too little raising agent	Unrisen, dense texture

What happens when food is cooked:

Changes to: **Taste** **Colour** **Texture** **Smell**

Protein denaturation: the process of altering a protein's molecular characteristics or properties

Proteins: Coagulation The process of turning a liquid into a solid
Example: Egg

Carbohydrates: Gelatinization When heated a mixture thickens as starch particles absorb water
Example: White sauce

Carbohydrates: Caramelisation Sugars change colour and flavour when heated
Example: Onions

Carbohydrates: Dextrinization the browning that happens when starches are cooked
Example: Toast

Fats: Plasticity the ability of fat to hold its shape

Water: Evaporation when water is heated it turns into a gas

Effecyt of pH, Oxygen and Enzymes of Food:

Effect of pH

Acid denatures protein, and preserves food
Causes milk to coagulate and split
Vinegar can preserve or pickle
Denature proteins in marinade to make them more tender
Alkali
Bicarbonate of soda acts as a raising agent by reacting with acids to produce gas

The effect of oxygen

Fruit and vegetables
Go brown when peeled or sliced.
This is known as enzymic browning.
To slow it down, put them in water (this stops the oxygen getting to it)
Meat, poultry and fish
Makes the blood in meat go brown. It is still safe to eat.
Fats and oils
Gradually makes them go rancid

Enzymes:

(Biological catalysts that speed up biochemical reactions.)
Digestive enzymes break food down in your digestive system.
Enzymes cause food to ripen
Enzymes to break down connective tissues and develop flavour in meat

GCSE Food Preparation and Nutrition

Section 5: Where Food Comes From

Seasonal Foods

What is seasonal food?

Food grows at different times of year in England. The time that food is ripe for eating is known as its season. Food grows in different countries at different times, so if food is not in season in England, it can be transported from another country.

Why is eating seasonal food whenever you can a good idea?

- Seasonal foods are fresher.
- Seasonal foods taste better, as they are full of flavour.
- Seasonal foods have less environmental impact because carbon footprints are reduced.
- Local foods supports the local community.

What are Food Miles?

The distance food has travelled.
Less food miles are better for the environment.

How to reduce them:

Eat seasonal, local food where possible

What is a Carbon Footprint?

The amount of energy you use during your lifetime.

How to reduce it:

Don't fill the kettle (only boil what you need)
Reduce food waste
Eat seasonal, local food where possible
Reuse/Recycle food packaging

To generate electricity, power stations need to burn fossil fuels. This causes gases such as carbon dioxide to be released into the atmosphere.

ng recycled aterials to anufacture w products uses less energy, which means less pollution from greenhouse gases and less global warming.

Food Waste

What is food waste?

Food waste is food that is discarded, lost or uneaten.

What is the difference between best before, use by and sell by date?

- Best Before date: It means the product will taste best up until that date. It is still edible and okay to eat a little past the listed date, though you may notice a slight change in texture, flavour, or colour.
- Use by date: The date that food should be used by. After this it may be unsafe.
- Sell by date: a date marked on a perishable product indicating the recommended time by which it should be sold.

Tips for reducing food waste

- **Reduce**
- **Reuse**
- **Redistribute/recycle**
- **First in first out (FIFO)**
- **Store food correctly – use your freezer**
- **Don't cook too much**
- **Know the difference between best before and use by dates**

LOVE FOOD hate waste

Section 5: Where Food Comes From

Food Processing

Primary Processing

Primary processing is the turning raw food materials to foods that can be eaten or to ingredients that are used to make food products.	Techniques	Examples
	• Washing • Milling • Trimming • Squeezing • Peeling • Butchery • Shelling and chopping	• Pasteurising Milk • Preparing Vegetables • Milling Flour • Cutting Chicken • Cutting Steaks • Removing husk from Rice



Secondary Processing

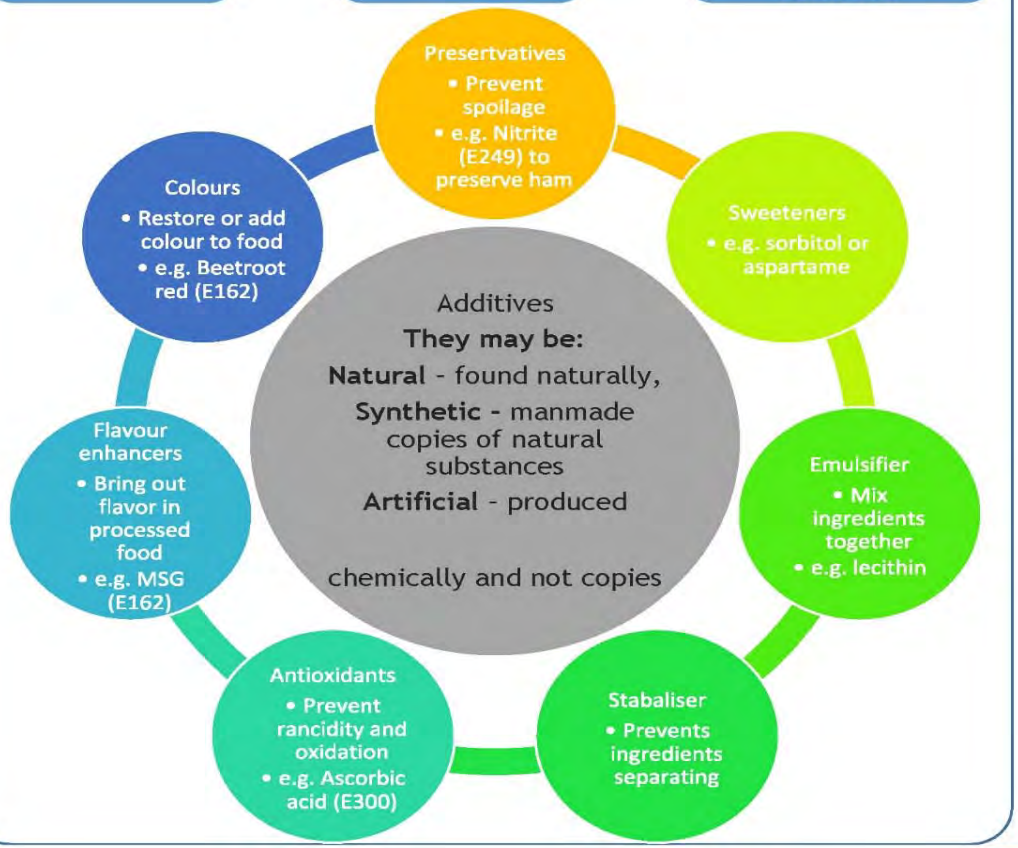
When you turn primary processed food into food products.	Techniques	Examples
	• Mixing • Heating • Cooling • Drying • Fortifying	• Using flour to make bread • Using milk to make butter or cheese • Making meat and fish products • Making complete ready to eat meals. • Fortifying flour • Using flour to make biscuits

Food Additives

Food additives are added to products for a specific function (to do a job)

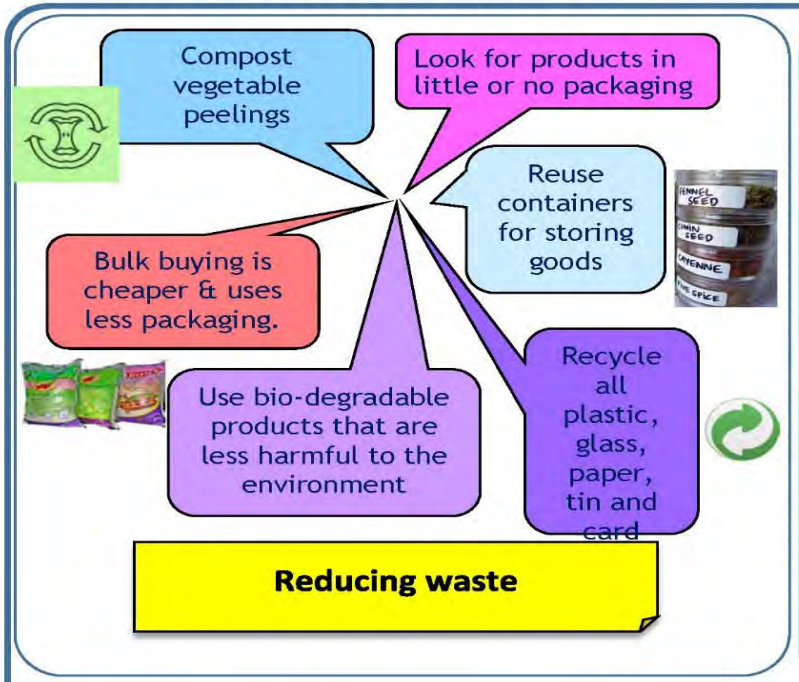
Examples of these jobs are adding colour, flavour or texture, and preserving food.

They are tested to make sure they are safe, but can have side effects like hyperactivity and have been linked to cancer, depression and allergic reactions.



Why Process Food?	Advantages	Disadvantages
	• Makes it last longer • Makes it look nicer • Makes it easier to digest • More convenient • Nutrients can be added in secondary processing • Makes it safer • Makes it easier to use • Makes it easier to market or brand	Nutrients are lost in primary processing Food additives can be dangerous Can be high in fat, salt and sugar

Section 5: Where Food Comes From



Sustainability of food

Food production is one of the greatest causes of environmental damage

We need to produce more food with less environmental impact

- Meat production increases air and water pollution
- Crops used for animal feed reduces bio-diversity
- Crop production uses lots of pesticides which harm insects
- Deforestation for crop growth damages the environment

Challenges include

- Increased demand,
- Stability in supplies,
- Use of antibiotics in meat farming

Solutions include

- Buying organic food
- Buying local food
- Eating less meat
- Growing your own
- Buying sustainable fish (MSC)
- Buying Fairtrade products

Food security

- Having enough food
- Having the resources to get food
- Knowing how to use food for a healthy diet
- Having enough water and sanitation

Causes

- Poverty
- Trade
- Conflict
- Disasters
- Population
- Health

Conserving an ecological balance by avoiding depletion of natural resources is known as **sustainable**.

Reduce means to cut down on the amount of waste being thrown out.

Conservation means to preserve (or make them last) for the future.

Something that is used over and over again, is called **reuse.**

To re-use an item and create something else with it, is known as **recycle**

Something that is able to rot naturally is called **bio-degradable**,

Energy provides the fuel to cook on or the power we use both electricity and gas.

Food Labelling

Why Bother?

It is the law!

- The Food Safety Act 1990
- Trade Description Act 1968
- Weights & Measures Act 1985
- Food Labelling Regulations 1996

To sell food and drink products, the label must be: Clear and easy to read; Permanent; Easy to understand; Easily visible; Not misleading

Food labelling - what you must show	
On the front of the product:	**Anywhere else (side/back or front)**
The name of the food A 'best before' or 'use by' date Any necessary warnings Quantity information	A list of ingredients The name and address of the manufacturer The batch number Any special storage conditions Instructions for use or cooking, Barcode Place of origin

Section 5: Where Food Comes From - Packaging

Properties of Packaging					
	Strong	Keeps food hot	Portion control	Hygienic	Light weight
Will not leak	Does not react with food	Can be written on	Provides protection	Environmentally friendly	Keeps food fresh



Example	Use	Reasons	
Cardboard boxes	Pizzas	Easy to print Soak up grease	Protect pizza when carrying Keep pizza hot
Polystyrene boxes	Burgers, fish and chips	Strong Light to carry	Do not react with food Keep food warm (insulator)
Clear plastic boxes	Sandwiches	Easy to print Light to carry	Keep fresh Hygienic
Foil trays with cardboard lids	Indian/Chinese TA	Keep hot Easy to write on	Stack easily lightweight
Plastic containers with lids	Indian/Chinese TA	Keep hot Seals mean no leaks	Reuse Do not react with food


Takeaway Packaging

Types of packaging

Why Package Food?

- To protect the contents
- To hold the contents
- To keep food fresh
- To reduce food waste
- To make food easier to handle, transport and serve
- To improve hygiene
- To make it look more attractive
- To give information on contents, storage and use

Reducing Food Packaging Waste

Reduce

- Avoid packaged products
- Take re-usable bags with you when shopping

Reuse

- Buy refill packs
- Glass milk bottles are returnable
- Use jars or tubs for storage at home

Recycle

- Paper, card, metal and some plastics
- Collected by the council, or you could take them to a recycling bank

Sustainable packaging should

- Be sourced manufactured, transported and recycled using renewable energy.
- Maximise the use of renewable or recycled materials.
- Be designed to optimise materials & energy
- Be low toxic in it's manufacture, use and disposal
- Use local materials and resources where possible
- Be able to meet market criteria for performance and cost.
- Be beneficial, safe and healthy for throughout it's lifecycle

Packaging	Advantages		Disadvantages	
Paper and Card	Easily printed Can be recycled	Strong when dry Lightweight	Crushes easily Weak when wet	Recycled paper and card cannot be used
Glass	Easily printed Can be recycled Can be reused	Strong Can carry liquids Quality	Brittle (breaks easily)	Expensive
MAP (Modified Atmosphere Packaging)	Gives food a stronger atmosphere (fresh meat, fresh fish and salads)		Once opened food deteriorates quickly	
Metal	Recyclable Easily printed	Strong Rigid	Must be coated or it will react with food Cannot microwave	Uses energy to produce them
Plastic or Polystyrene	Strong Flexible	Easily printed Does not react with food	Litter Limited resource	Can be hard to recycle Chemicals

GCSE Food Preparation and Nutrition

Unit 6: Cooking and food Preparation
Factors affecting food choice

You need to be able to use sensory descriptors to correctly describe the sensory qualities (how food looks, tastes, feels and smells) for a range of foods and combinations.

Sensory Testing

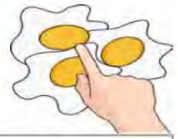
Humans taste with their tongue and nose.
Tongues have thousands of taste buds that detect 5 things

- Salt
- Sweet
- Sour
- Bitter
- Umami (savoury)

We use our **taste buds** together with **olfactory receptors** in the nose (which detect smells) to identify the flavour of foods.

People use a combination of these senses to decide whether food is appetising.



Sight	Smell	Taste	Touch
Food must look appealing; colourful, fresh, attractively presented.	Smell helps us to taste food. How it is cooked and flavoured will affect the aroma that it gives off.	Must be enjoyable. Cooking method, freshness of ingredients, herbs and seasing all affect overall taste	Texture can make a big difference. Crunchy not soggy veg, firm not soggy pasta, crunchy not soft biscuits.

Sensory Testing needs to be fair and unbiased. Your test should allow you to find out other people's opinions of your food so you can improve it.

1. Use enough tasters to gather a range of opinions
2. Consider a blind test - where tasters are not told what they are testing
3. Allow tasters to work alone si they are not influenced by others
4. Give tasters clear instructions of what you want them to do
5. Only buse small samples to avoid filling up your tasters!
6. Allow tasters to drink water in between each sample to wash away previous tastes
7. Tests should be carried out in clean, hygienic and quiet locations

Results can then be analysed to allow you to improve your product.

Ranking Test
Foods are tasted and put in order from lowest to highest for a particular characteristic or quality e.g. sweetness. The scores are totaled at the end.

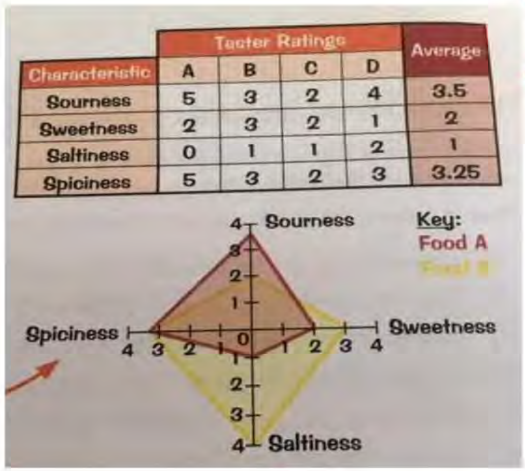
Profiling Test
Tasters rate certain characteristics of food and the average rating of each is worked out to create a profile of the food. This can be displayed visually on a star diagram Star diagrams can be overlapped to compare two different foods.

Paired Preference Test
Two slightly different food products e.g. biscuits (one made with margarine and the other with butter) are tasted and the taster choses their favourite.

Triangle Test
This is a type of discrimination test. Three foods are tested where two are the same and one has a tweaked recipe. The taster has to identify which product differs from the others.

Hedonic Rating Test
People rate a variety of foods using a scale e.g. 1-5, hate/love, or smiley face and sad face..

Characteristic	Taster Ratings A	B	C	D	Average
Sourness	5	3	2	4	3.5
Sweetness	2	3	2	1	2
Saltiness	0	1	1	2	1
Spiciness	5	3	2	3	3.25



GCSE Food Preparation and Nutrition

Unit 6: Cooking and food Preparation
Factors affecting food choice

There are a great deal of factors that influence someone's food choices.

Factors affecting food choice

- Physical Activity Level (PAL)
- Healthy eating
- Cost of food
- Income
- Culinary Skills
- Lifestyle
- Seasonality
- Availability
- Special Occasions
- Enjoyment
- Allergies
- Intolerances
- Animal welfare
- Working conditions (fair trade)
- Environmental impact
- Eating naturally

Different Religions Have Different Views on Food

Hinduism

Many Hindus are vegetarian. Some vegetables are avoided as they are seen as harmful, including garlic, onions and mushrooms. Some HIndus do eat meat but it must be slaughtered using a quick painless method called Jhatka. Cows are considered sacred and cannot be eaten.

Christianity

No strict dietary rules
During lent some christians give up certain foods or drinks
Specific food traditionally eaten during celebrations. Hot cross buns on good friday, pancakes for shrove tuesday.

Islam

Meat eaten by Islams must be halal - the animal is slaughtered in a specific way whilst being blessed. Muslims cannot eat pork or product made from pigs such as gelatine. They cannot drink alcohol. During Ramadan muslims fast between sunrise and sunset.

Sikhism

Baptised Sikhs are prohibited from eating ritually slaughtered meat (kosher and halal), may are vegetarian. Sikhism teaches against overindulging and only to eat what is needed.

Judaism

Follow Jewish dietary laws (kashrut). Food must be kosher - fir for consumption.
Kosher animals have split hooves and chew the cud - cows and deer. Can eat fish with fins and scales but no shellfish.
Slaughter of animals must be quick and painless
Cannot eat pig, rabbit, hare, camel and many other animals. Dairy and meat products cannot be cooked or mixed together

Buddhism

Bussists believe all living things are sacred and most are vegetarian or vegan.
Most do not drink alcohol. Some chose to fast from noon until the following sunrise.

Rastafarianism

Eaten pork is forbidden.
Many eat a clean and natural diet called I-tal, mainly made up of vegetables.
The can eat fish under 30cm. Many do not drink alcohol. They drink things made from naturally grown produce such as herbal tea or fruit juice.

GCSE Food Preparation and Nutrition

Unit 6: Cooking and food Preparation
Factors affecting food choice

Food labels help people to make informed choices about what they eat. The information is controlled by different regulations.

Compulsory Information

Food Labelling Regulations

- **Food Information for Consumer (FIC)** updated in 2014 must be followed by all **european union countries (EU)**
- **From 2016 it was compulsory for nutritional information to be included on the label**
- **The food standards agency (FSA) is responsible in the UK for ensuring manufacturers follow the regulations**
- **In the UK mood labels must not mislead, be easy to read and all allergies must be emphasised.**

Sucrose-Free Plain Milk Chocolate

Nutrition Facts

Serving Size: 1 Chocolate Bar (50g)

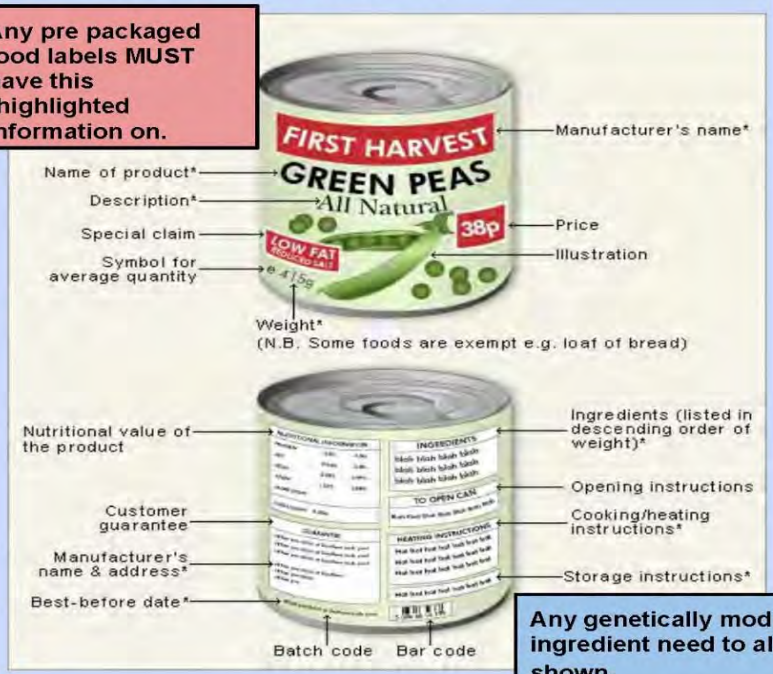
Typical Nutritional Information	Per 100g	Per 50g Serving
Energy (kJ)	**1691**	**846**
Protein (g)	**9**	**4.5**
Glycaemic Carbohydrates (g)	**7.5**	**3.75**
of which total sugars* (g)	6.8	3.4
of which Polyols (g)	48	24
of which Starch (g)	1	0
Total Fat (g)	**16.56**	
of which saturated fat (g)	11.5	5.8
of which trans fat (g)	0	0
of which monounsaturated fat (g)	4.4	2.2
of which polyunsaturated fat (g)	0.7	0.3
Cholesterol (mg)	**12**	**6**
Dietary Fibre# (g)	**5**	**2.5**
Total Sodium (mg)	**66**	**33**

AOAC 991.43 | *Sugar from Cow's Milk (Lactose)

Each nutrient must be given per 100g of the food

Energy si given in kilojoules, and the rest in grams

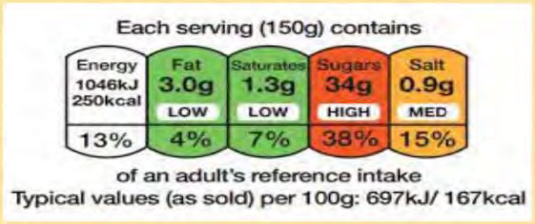
Any pre packaged food labels MUST have this *highlighted information on.



Any genetically modified ingredient need to also be shown.

Non - Compulsory Information

- **Manufacturers will often add information or claims about their products to make them more attractive to the consumer**
- **Traffic light labelling allows people to see how healthy the product is at a glance. These are useful but not required by law.**



- **Products can state whether they are suitable for certain groups, such as religious groups or dietary choice e.g. vegan**
- **Country of origin**
- **Serving suggestions.**

GCSE Food Preparation and Nutrition

Unit 6: Cooking and food Preparation
Factors affecting food choice

Companies use marketing tools to try to get you to buy there food and drinks.

Special offers

Very common in supermarkets and wherever food is sold.

Designed to **convince** you to buy the food - perhaps even more than you actually need

Loyalty card schemes - where you collect points
for your shopping - record your food choices then they can send you matching offers.

Point of sale marketing - placing products near the till to tempt you as you queue to pay.

Celebrity Brand Endorsements

Some companies are endorsed by **celebrity chefs** to **boost sales**, the chefs name can be used to **convince** you that it's a **high quality product.**
Celebrities from **TV or films** may also be used on advertising, their association again suggests a high quality product.
Food companies may **sponsor sports teams or individuals e.g. Lucozade** has had links with many sport stars past and present. They may pay to have their product **name displayed at sporting events** too so it is seen by a wide audience.

Health Claims

Manufacturers may **promote particular health benefits**.
Such claims make the product look **healthy** and may **boost sales**.

They may launch a **low sugar** or **low fat** version of a product e.g. **Coke Zero**.

Gluten or lactose free products target individuals with a specific **dietary need or choice**.

Promotion of Ethical Values

Fair Trade products may cost more to produce but they can **charge more** and the product may appeal to a **wider audience**.

Organic food again can be sold at a **higher price** and can target a **specific audience**.

Packaging may be **environmentally friendly** - it may be **biodegradable or recyclable.**

Some products may be **labelled** as **natural** or **fresh** even if they contain artificial chemicals,

GCSE Food Preparation and Nutrition

You need to be able to use sensory descriptors to correctly describe the sensory qualities (how food looks, tastes, feels and smells) for a range of foods and combinations.

Knife Skills

Meat, fish and alternatives

- fillet a chicken breast, portion a chicken
- remove fat and rind,
- fillet fish,
- slice raw and cooked meat and fish or alternatives (such as tofu and halloumi) evenly and accurately

fruits and vegetables

- bridge hold,
- claw grip,
- peel,
- slice,
- dice
- cut into even size pieces (i.e. batons, julienne)

Prepare fruits and Vegetables

- mash, shred, scissor snip, scoop, crush, grate, peel,
- segment, de-skin, de-seed,
- blanch, shape, pipe, blend,
- juice and prepare garnishes
- demonstrate the technical skills of controlling enzymic browning and spoilage and preventing food poisoning (wash and dry where appropriate)

Tenderise and Marinate

Demonstrate how acids denature protein and marinades add flavour and moisture when preparing vegetables, meat, fish, and alternatives

Prepare combine and shape

- Roll, wrap,
- skewer, mix,
- coat,
- layer meat, fish and alternatives,
- shape and bind wet mixtures (such as falafels, fish cakes or meatballs)
- demonstrate the technical skill of preventing cross contamination and handle high risk foods correctly

Select and adjust a cooking Process

Select and adjust the cooking process and length of time to suit the ingredient, for example to match the cut of meat, fish and alternatives

GCSE Food Preparation and Nutrition

You need to be able to use sensory descriptors to correctly describe the sensory qualities (how food looks, tastes, feels and smells) for a range of foods and combinations.

Making Sauces

- Make a blended white sauce (starch gelatinisation) a roux and all in one blended sauce, infused sauce, veloute, bechamel, to demonstrate understanding of how liquid/starch ratios affect the viscosity and how conduction and convection work to cook the sauce and the need for agitation
- Make a reduction sauce such as pasta sauce, curry sauce, gravy, meat sauce (including meat alternatives such as myco-protein and textured vegetable protein) to demonstrate how evaporation concentrates flavour and changes the viscosity of the sauce
- make an emulsion sauce such as a salad dressing, mayonnaise, hollandaise to demonstrate the technical skill of how to make a stabilised emulsion

Water based methods using the hob

Demonstrate the following techniques:

- steaming
- boiling and simmering
- blanching
- poaching

Weigh and Measure

Demonstrate accurate measurement of liquids and solids

Dry heat and fat based methods using the hob

Demonstrate the following techniques:

- dry frying
- pan (shallow frying)
- stir frying

Preparation of ingredients and equipment

Demonstrate the following techniques:

· grease/oil, line, flour, evenly and with attention to finished product

GCSE Food Preparation and Nutrition

You need to be able to use sensory descriptors to correctly describe the sensory qualities (how food looks, tastes, feels and smells) for a range of foods and combinations.

Using Raising agents

Demonstrate the following techniques:

- Use egg (Colloid foam) as a raising agent—create gas in air foam—whisking egg whites, whisked sponge
- Use Chemical Agents—self rasing flour, baking powder, bicarbonate of soda
- Use Steam in a mixture (Choux Pastry, Batter)

Using the oven

Demonstrate the following techniques:

- baking
- roasting
- casseroles and/or tagines
- braising

Set a mixture - removal of heat (gelation)

Demonstrate the following techniques:

use starch to set a mixture on chilling for layered desserts such as custard or cheesecake

Use of Equipment

Demonstrate the followingtechniques:

- use a blender, food processor, mixer, and microwave

Set a mixture - heating (coagulation

Demonstrate the following techniques:

- use protein to set a mixture on heating such as denatured
- protein in eggs for quiche, choux pastry

Using the grill

Be able to demonstrate the following Demonstrate the following techniques with a range of foods, such as vegetables, meat, fish or alternatives such as halloumi, seeds and nuts:

- char
- grill or toast

GCSE Food Preparation and Nutrition

You need to be able to use sensory descriptors to correctly describe the sensory qualities (how food looks, tastes, feels and smells) for a range of foods and combinations.

Shaping and finishing dough

Demonstrate the following techniques:

- roll out pastry, use a pasta machine, line a flan ring, create layers (palmiers), proving/resting
- glazing and finishing such as pipe choux pastry, bread
- rolls, pasta, flat breads, pinwheels, pizza, calzone

Test for Readiness

Demonstrate the following techniques:

- use a temperature probe, knife/skewer, finger or 'poke' test, 'bite', visual colour check or sound to establish whether an ingredient or recipe is ready

Judge and manipulate sensory Properties

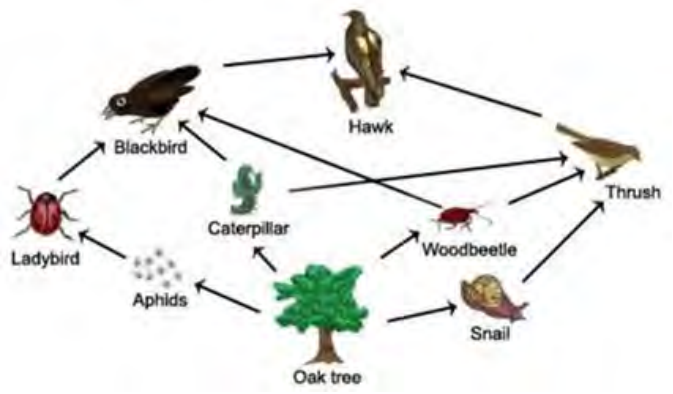
Demonstrate the following techniques:

- how to taste and season during the cooking process
- Change the taste and aroma through the use of infusions, herbs and spices, paste, jus, reduction
- how to change texture and flavour, use browning
- (dextrinisation) and glazing, add crust, crisp and crumbs
- presentation and food styling – use garnishes and
- decorative techniques to improve the aesthetic qualities,
- demonstrate portioning and presenting

Year 10 Knowledge Organisers

Geography

- Introduction to Ecosystems – Key Terms
-
- An **ecosystem** is a natural system made up of **plants**, **animals** and the **environment**. There are links between the living and non-living components (parts/sections) of an ecosystem.
- **Biotic components** are the living features of an ecosystem such as plants and animals
- **Abiotic components** are the non-living factors such as climate (temperature and rainfall), soil, water and light.
- The organisms in ecosystems can be classed as
- **consumers**, **decomposers** or **producers**.
- **Producer** is an organism that uses sunlight energy to produce food.
- **Consumer** is an organism that gets its energy by eating other organisms – it eats producers or other consumers.
- A **food chain** shows what eats what
- A **food web** shows lots of food chains & how they overlap.



Tropical Rainforests

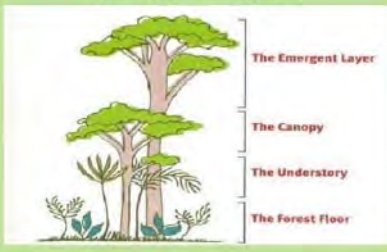
Location: Mostly on the equator and up to 23.5º either side. The rainforest is more common in the southern hemisphere. It is not found in Europe or Antarctica. Examples include the Amazon Rainforest and the Borneo Rainforest.

The case study we use is the Amazon Rainforest.

Climate	**Rain almost every day, varying temperatures throughout the year from 25ºC-30ºC. Very humid. Some months have over 300mm of rainfall. No real seasons.**
Soil	Latosols. Poor quality, shallow and acidic soil. Iron oxide stains the top layer red. Heavy rainfall washes away the nutrient layer. Generally infertile but the nutrient layer is constantly being replaced and the plants roots are shallow therefore quickly absorbed.
Vegetation	Orchid, Banana Tree, Bamboo Tree, Coconut Tree, Liana
Animals	Pythons, Jaguars, Vampire Bats, Iguanas, Frogs, Macaws, Monkeys, Grasshoppers
Human Uses	Wood, Mining, Industry, Cattle Ranching, Medicine, Homes, Tourism

Adaptation	Use
Buttress Roots	A set of roots which provide further stability for a tree as the soil is shallow.
Stilt Roots	Roots which provide support as they are anchored in the shallow soils.
Red Leaves	Protects the plant from sunlight. They act as a sunscreen by reflecting red light.
Lianas	They use other trees to climb up into the canopy to maximise the exposure to sunlight.
Leaf Angling	Leave are arranged at different angles so that a plant avoids shading its own leaves.
Drip Tips	Leaves have a waxy surface to enable excess rainwater to run-off easily, preventing the growth of algae.
Epiphytes	They live on the surface of other plants.
Thin Bark	The bark is thin and smooth as the trees don't need to prevent moisture as there is plenty of water in the air.

Rainforest Layers



Year 10 Knowledge Organisers

Maths

Equations and not equations

Knowledge Organiser

Topic/Skill	Definition/Tips	Example
1. Solve	To find the **answer**/value of something **Use inverse operations** on both sides of the equation (balancing method) until you find the value for the letter.	Solve $2x - 3 = 7$ Add 3 on both sides $2x = 10$ Divide by 2 on both sides $x = 5$
2. Inverse	**Opposite**	The inverse of addition is subtraction. The inverse of multiplication is division.
3. Rearranging Formulae	**Use inverse operations** on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of $y = \frac{2x-1}{z}$ Multiply both sides by z $yz = 2x - 1$ Add 1 to both sides $yz + 1 = 2x$ Divide by 2 on both sides $\frac{yz+1}{2} = x$ We now have x as the subject.
4. Writing Formulae	**Substitute letters for words** in the question.	Bob charges £3 per window and a £5 call out charge. $C = 3N + 5$ Where N=number of windows and C=cost

Equations and not equations

5. Substitution	**Replace letters with numbers**. Be careful of $5x^2$. You need to square first, then multiply by 5.	$a = 3, b = 2$ *and* $c = 5$. Find: 1. $2a = 2 \times 3 = 6$ 2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$ 3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$
6. Quadratic	A quadratic expression is of the form $\boldsymbol{ax^2 + bx + c}$ where a, b and c are numbers, $\boldsymbol{a \neq 0}$	Examples of quadratic expressions: x^2 $8x^2 - 3x + 7$ Examples of non-quadratic expressions: $2x^3 - 5x^2$ $9x - 1$
7. Factorising Quadratics	When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that **add to give b** and **multiply to give c**.	$x^2 + 7x + 10 = (x + 5)(x + 2)$ (because 5 and 2 add to give 7 and multiply to give 10) $x^2 + 2x - 8 = (x + 4)(x - 2)$ (because +4 and -2 add to give +2 and multiply to give -8)
8. Difference of Two Squares	An expression of the form $\boldsymbol{a^2 - b^2}$ can be factorised to give $\boldsymbol{(a + b)(a - b)}$	$x^2 - 25 = (x + 5)(x - 5)$ $16x^2 - 81 = (4x + 9)(4x - 9)$
9. Solving Quadratics ($ax^2 = b$)	Isolate the x^2 term and square root both sides. Remember there will be a **positive and a negative solution**.	$2x^2 = 98$ $x^2 = 49$ $x = \pm 7$
10. Solving Quadratics ($ax^2 + bx = 0$)	**Factorise** and then **solve = 0**.	$x^2 - 3x = 0$ $x(x - 3) = 0$ $x = 0$ *or* $x = 3$

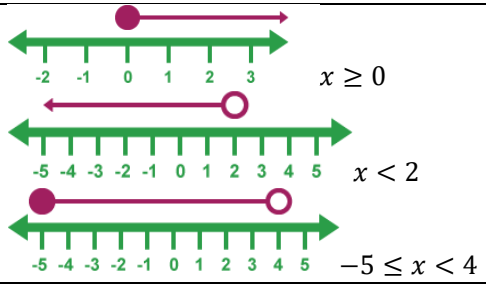
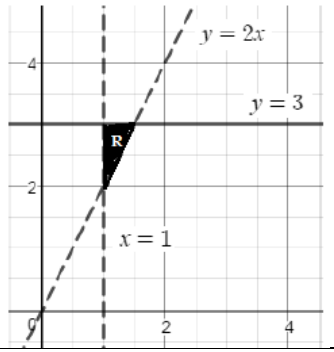
Equations and not equations

11. Solving Quadratics by Factorising $(a = 1)$	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve $x^2 + 3x - 10 = 0$ Factorise: $(x + 5)(x - 2) = 0$ $x = -5 \; or \; x = 2$
12. Simultaneous Equations	A set of **two or more equations**, each involving **two or more variables** (letters). The **solutions** to simultaneous equations **satisfy both**/all of the **equations**.	$2x + y = 7$ $3x - y = 8$ $x = 3$ $y = 1$
13. Variable	A **symbol**, usually a **letter**, which **represents a number** which is usually unknown.	In the equation $x + 2 = 5$, x is the variable.
14. Coefficient	A **number** used to **multiply** a **variable**. It is the number that comes before/in front of a letter.	6z 6 is the coefficient z is the variable
15. Solving Simultaneous Equations (by Elimination)	1. **Balance** the **coefficients** of one of the variables. 2. **Eliminate** this variable by adding or subtracting the equations (**Same Sign Subtract, Different Sign Add**) 3. **Solve** the linear equation you get using the other variable. 4. **Substitute** the value you found back into one of the previous equations. 5. **Solve** the equation you get. 6. **Check** that the two values you get satisfy both of the original equations.	$5x + 2y = 9$ $10x + 3y = 16$ Multiply the first equation by 2. $10x + 4y = 18$ $10x + 3y = 16$ Same Sign Subtract (+10x on both) $y = 2$ Substitute $y = 2$ in to equation. $5x + 2 \times 2 = 9$ $5x + 4 = 9$ $5x = 5$ $x = 1$ Solution: $x = 1, y = 2$

Equations and not equations

16. Solving Linear and Quadratic Simultaneous Equations	Method 1: If both equations are in the same form (eg. Both $y =\ldots$): 1. Set the equations **equal to each other**. 2. **Rearrange** to make the equation **equal to zero**. 3. **Solve** the quadratic equation. 4. **Substitute** the values back in to one of the equations. Method 2: If the equations are not in the same form: 1. **Rearrange** the linear equation into the form $y =\ldots$ or $x =\ldots$ 2. **Substitute** in to the quadratic equation. 3. **Rearrange** to make the equation **equal to zero**. 4. **Solve** the quadratic equation. 5. **Substitute** the values back in to one of the equations. You should get **two pairs of solutions** (two values for x, two values for y.) Graphically, you should have **two points of intersection**.	<u>Example 1</u> Solve $y = x^2 - 2x - 5$ and $y = x - 1$ $x^2 - 2x - 5 = x - 1$ $x^2 - 3x - 4 = 0$ $(x - 4)(x + 1) = 0$ $x = 4$ and $x = -1$ $y = 4 - 1 = 3$ and $y = -1 - 1 = -2$ Answers: (4,3) and (-1,-2) <u>Example 2</u> Solve $x^2 + y^2 = 5$ and $x + y = 3$ $x = 3 - y$ $(3 - y)^2 + y^2 = 5$ $9 - 6y + y^2 + y^2 = 5$ $2y^2 - 6y + 4 = 0$ $y^2 - 3y + 2 = 0$ $(y - 1)(y - 2) = 0$ $y = 1$ and $y = 2$ $x = 3 - 1 = 2$ and $x = 3 - 2 = 1$ Answers: (2,1) and (1,2)
17. Inequality	An inequality says that two values are **not equal**. $a \neq b$ means that a is not equal to b.	$7 \neq 3$ $x \neq 0$

Equations and not equations

18. Inequality symbols	$x > 2$ means **x is greater than 2** $x < 3$ means **x is less than 3** $x \geq 1$ means **x is greater than or equal to 1** $x \leq 6$ means **x is less than or equal to 6**	State the integers that satisfy $-2 < x \leq 4$. -1, 0, 1, 2, 3, 4
19. Inequalities on a Number Line	Inequalities can be shown on a number line. **Open circles** are used for numbers that are **less than or greater than** $(< or >)$ **Closed circles** are used for numbers that are **less than or equal or greater than or equal** $(\leq or \geq)$	
20. Graphical Inequalities	Inequalities can be represented on a coordinate grid. If the inequality is **strict** $(x > 2)$ then use a **dotted line**. If the inequality is **not strict** $(x \leq 6)$ then use a **solid line**. **Shade** the **region** which satisfies all the inequalities.	Shade the region that satisfies: $y > 2x, x > 1 \; and \; y \leq 3$ 

Equations and not equations

MathsWatch References and Worksheet Links:

135a – solving equations

136 – Rearranging formulae

157/192 – Factorising and solving quadratic equations

158 – Difference of two squares

191 – Solving quadratics using the formula

162 – Solve simultaneous equations

211 – Solve simultaneous equations with a quadratic

139 – Solve linear inequalities

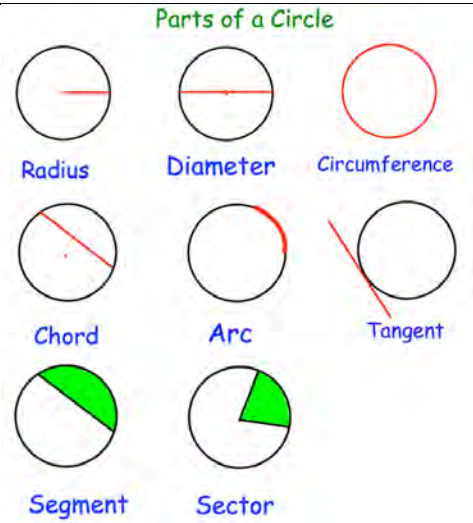
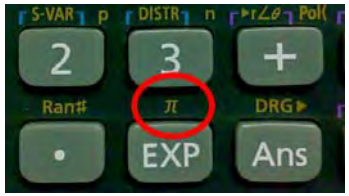
138 – Inequalities on a number line

Getting the most out of life

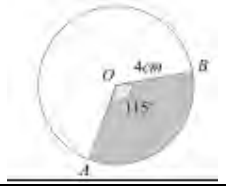
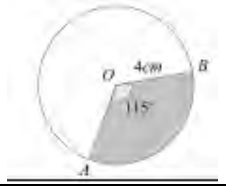
Knowledge Organiser

Topic/Skill	Definition/Tips	Example
1. Rounding	Find the place value you need to round to, look one place to the right. 5 or more – round up 4 or less – keep the same	45.678 to 1 decimal place is 45.7
2. Rounding to significant figures	Significant means important. Find the number of places that are significant (the first digit that isn't a 0 is your starting point), look one place to the right. 5 or more – round up 4 or less – keep the same Remember – keep the place value of the original number	45.678 To 1.s.f is 50 To 2.s.f is 46 To 3.s.f is 45.7 To 4.s.f is 45.68
3. Estimating	When you are asked to estimate, round each number to 1 significant figure, then calculate.	Estimate 36.5 x 3.7 40 x 4 = 160
4. Circle	A circle is the locus of all points equidistant from a central point.	

Getting the most out of life

5. Parts of a Circle	**Radius** – the **distance** from the **centre** of a circle to the **edge** **Diameter** – the total **distance** across the **width** of a circle **through the centre**. **Circumference** – the **total distance** around the **outside** of a circle **Chord** – a **straight line** whose **end points lie on a circle** **Tangent** – a **straight line** which **touches** a circle at exactly **one point** **Arc** – a **part of the circumference** of a circle **Sector** – the **region** of a circle enclosed by **two radii** and their intercepted **arc** **Segment** – the **region** bounded by a **chord** and the **arc** created by the chord	
6. Area of a Circle	$\boldsymbol{A = \pi r^2}$ which means 'pi x radius squared'.	If the radius was 5cm, then: $A = \pi \times 5^2 = 78.5cm^2$
7. Circumference of a Circle	$\boldsymbol{C = \pi d}$ which means 'pi x diameter'	If the radius was 5cm, then: $C = \pi \times 10 = 31.4cm$
8. π ('pi')	Pi is the circumference of a circle divided by the diameter. $\boldsymbol{\pi \approx 3.14}$	

Getting the most out of life

9. Arc Length of a Sector	The arc length is part of the circumference. Take the **angle** given **as a fraction over 360°** and **multiply** by the **circumference**.	Arc Length $= \frac{115}{360} \times \pi \times 8 = 8.03cm$ 
10. Area of a Sector	The area of a sector is part of the total area. Take the **angle** given **as a fraction over 360°** and **multiply** by the **area**.	Area $= \frac{115}{360} \times \pi \times 4^2 = 16.1cm^2$ 

MathsWatch References and Worksheet Links:

31/32/90 – Rounding

91 – Estimating

116-118 – Circles

149 – Arcs and sectors

Laws of Indices

Knowledge Organiser

Topic/Skill	Definition/Tips	Example
1. Square Number	The number you get when you **multiply a number by itself**.	**1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225…** $9^2 = 9 \times 9 = 81$
2. Square Root	The **number you multiply by itself** to get another number. The reverse process of squaring a number.	$\sqrt{36} = 6$ because $6 \times 6 = 36$
3. Solutions to $x^2 =$	**Equations** involving **squares** have **two solutions**, one **positive** and one **negative**.	Solve $x^2 = 25$ $x = 5 \; or \; x = -5$ This can also be written as $x = \pm 5$
4. Cube Number	The number you get when you **multiply a number by itself and itself again**.	1, 8, 27, 64, 125… $2^3 = 2 \times 2 \times 2 = 8$
5. Cube Root	The **number you multiply by itself and itself again** to get another number. The reverse process of cubing a number.	$\sqrt[3]{125} = 5$ because $5 \times 5 \times 5 = 125$
6. Powers of…	The powers of a number are that **number raised to various powers**.	The powers of 3 are: $3^1 = 3$ $3^2 = 9$ $3^3 = 27$ $3^4 = 81$ etc.
7. Multiplication Index Law	When **multiplying** with the same base (number or letter), **add the powers**. $\boldsymbol{a^m \times a^n = a^{m+n}}$	$7^5 \times 7^3 = 7^8$ $a^{12} \times a = a^{13}$ $4x^5 \times 2x^8 = 8x^{13}$

Laws of Indices

8. Division Index Law	When **dividing** with the same base (number or letter), **subtract the powers**. $\boldsymbol{a^m \div a^n = a^{m-n}}$	$15^7 \div 15^4 = 15^3$ $x^9 \div x^2 = x^7$ $20a^{11} \div 5a^3 = 4a^8$
9. Brackets Index Laws	When raising a power to another power, multiply the powers together. $\boldsymbol{(a^m)^n = a^{mn}}$	$(y^2)^5 = y^{10}$ $(6^3)^4 = 6^{12}$ $(5x^6)^3 = 125x^{18}$
10. Notable Powers	$\boldsymbol{p = p^1}$ $\boldsymbol{p^0 = 1}$	$99999^0 = 1$
11. Negative Powers	A negative power performs the reciprocal. $\boldsymbol{a^{-m} = \frac{1}{a^m}}$	$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$
12. Fractional Powers	The denominator of a fractional power acts as a 'root'. The numerator of a fractional power acts as a normal power. $a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m$	$27^{\frac{2}{3}} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$ $\left(\frac{25}{16}\right)^{\frac{3}{2}} = \left(\frac{\sqrt{25}}{\sqrt{16}}\right)^3 = \left(\frac{5}{4}\right)^3 = \frac{125}{64}$
13. Standard Form	$\boldsymbol{A \times 10^b}$ $\boldsymbol{where\ 1 \leq A < 10, \quad b = integer}$	$8400 = 8.4 \times 10^3$ $0.00036 = 3.6 \times 10^{-4}$
14. Multiplying or Dividing with Standard Form	Multiply: **Multiply the numbers** and **add the powers**. Divide: **Divide the numbers** and **subtract the powers**.	$(1.2 \times 10^3) \times (4 \times 10^6) = 8.8 \times 10^9$ $(4.5 \times 10^5) \div (3 \times 10^2) = 1.5 \times 10^3$
15. Adding or Subtracting with Standard Form	**Convert** in to **ordinary** numbers, **calculate** and then **convert back** in to standard form	$2.7 \times 10^4 + 4.6 \times 10^3$ $= 27000 + 4600 = 31600$ $= 3.16 \times 10^4$

Laws of Indices

MathsWatch References and Worksheet Links:

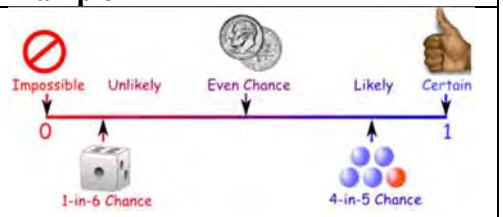
81 – Squares, cubes and roots

82/131/154 – Indices

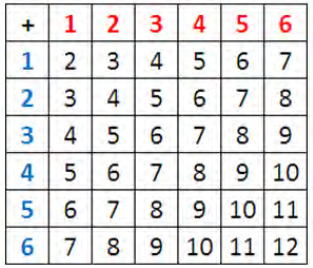
83 – Standard form

Probably best, probably not

Knowledge Organiser

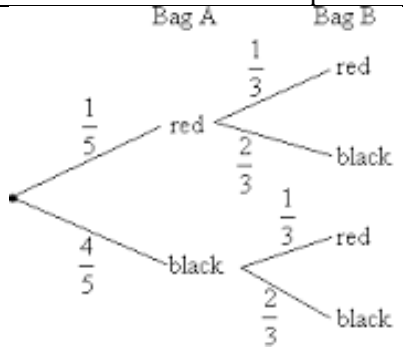
Topic/Skill	Definition/Tips	Example
1. Probability	The **likelihood/chance** of something happening. Is expressed as a number **between 0 (impossible) and 1 (certain)**. Can be expressed as a fraction, decimal, percentage or in words (likely, unlikely, even chance etc.)	
2. Probability Notation	**P(A)** refers to the **probability that event A will occur**.	P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.
3. Theoretical Probability	$\frac{\textit{Number of Favourable Outcomes}}{\textit{Total Number of Possible Outcomes}}$	Probability of rolling a 4 on a fair 6-sided die = $\frac{1}{6}$.
4. Relative Frequency	$\frac{\textit{Number of Successful Trials}}{\textit{Total Number of Trials}}$	A coin is flipped 50 times and lands on Tails 29 times. The relative frequency of getting Tails = $\frac{29}{50}$.
5. Expected Outcomes	To find the number of expected outcomes, **multiply** the **probability** by the **number of trials**.	The probability that a football team wins is 0.2 How many games would you expect them to win out of 40? $0.2 \times 40 = 8\ games$
6. Exhaustive	Outcomes are **exhaustive** if they **cover the entire range of possible outcomes**. The **probabilities** of an **exhaustive** set of outcomes **adds up to 1**.	When rolling a six-sided die, the outcomes 1, 2, 3, 4, 5 and 6 are exhaustive, because they cover all the possible outcomes.

Probably best, probably not

7. Mutually Exclusive	Events are mutually exclusive if they **cannot happen at the same time**. The **probabilities** of an exhaustive set of **mutually exclusive** events **adds up to 1**.	Examples of mutually exclusive events: - Turning left and right - Heads and Tails on a coin Examples of non mutually exclusive events: - King and Hearts from a deck of cards, because you can pick the King of Hearts
8. Sample Space	The **set of all possible outcomes** of an experiment.	
9. Sample	A **sample** is a small selection of items from a population. A sample is **biased** if individuals or groups from the population are not represented in the sample.	A sample could be selecting 10 students from a year group at school.

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Probably best, probably not

10. Sample Size	The larger a sample size, the closer those probabilities will be to the true probability.	A sample size of 100 gives a more reliable result than a sample size of 10.
1. Tree Diagrams	Tree diagrams show **all the possible outcomes** of an event and calculate their probabilities. **All branches must add up to 1 when adding downwards.** This is because the **probability of something not happening** is **1 minus the probability that it does happen**. **Multiply** going **across** a tree diagram. **Add** going **down** a tree diagram.	
2. Independent Events	The outcome of a **previous event does not influence/affect the outcome of a second event**.	An example of independent events could be <u>replacing</u> a counter in a bag after picking it.
3. Dependent Events	The outcome of a **previous event does influence/affect the outcome of a second event**.	An example of dependent events could be not replacing a counter in a bag after picking it. '<u>Without replacement</u>'

Probably best, probably not

4. Probability Notation	**P(A)** refers to the **probability that event A will occur**.	P(Red Queen) refers to the probability of picking a Red Queen from a pack of cards.
	P(A') refers to the **probability that event A will <u>not</u> occur**.	P(Blue') refers to the probability that you do not pick Blue.
	P(A ∪ B) refers to the **probability that event A <u>or</u> B <u>or</u> both will occur.**	P(Blonde ∪ Right Handed) refers to the probability that you pick someone who is Blonde or Right Handed or both.
	P(A ∩ B) refers to the **probability that <u>both</u> events A and B will occur.**	P(Blonde ∩ Right Handed) refers to the probability that you pick someone who is both Blonde and Right Handed.

MathsWatch References and Worksheet Links:

58 – Outcomes

59 – Calculating probabilities

125 – Experimental probability

126 – Possibility spaces

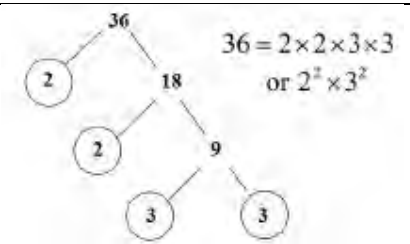
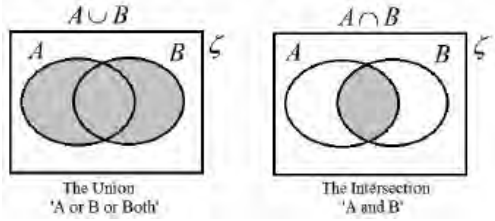
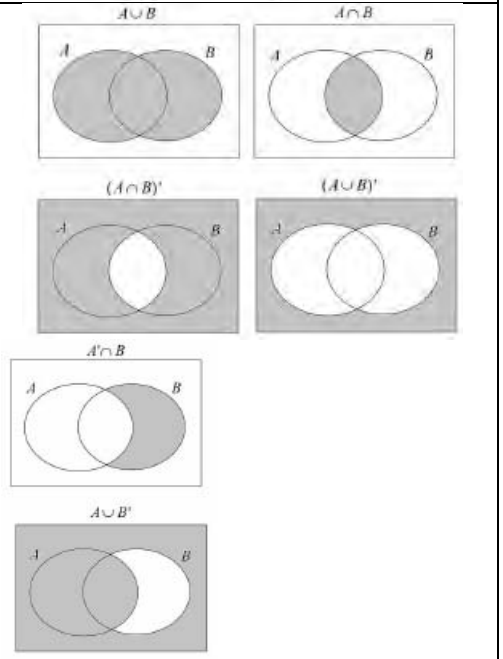
151/175 – Tree diagrams

Big Factor Hunt

Knowledge Organiser

Topic/Skill	Definition/Tips	Example
1. Multiple	The result of multiplying a number by an integer. The **times tables** of a number.	The first five multiples of 7 are: $7, 14, 21, 28, 35$
2. Factor	A number that **divides exactly** into another number without a remainder. It is useful to write factors in pairs	The factors of 18 are: $1, 2, 3, 6, 9, 18$ The factor pairs of 18 are: $1, 18$ $2, 9$ $3, 6$
3. Lowest Common Multiple (LCM)	The **smallest** number that is in the **times tables** of each of the numbers given.	The LCM of 3, 4 and 5 is 60 because it is the smallest number in the 3, 4 and 5 times tables.
4. Highest Common Factor (HCF)	The **biggest** number that **divides exactly** into two or more numbers.	The HCF of 6 and 9 is 3 because it is the biggest number that divides into 6 and 9 exactly.
5. Prime Number	A number with **exactly two factors**. A number that can only be divided by itself and one. The number **1 is not prime**, as it only has one factor, not two.	The first ten prime numbers are: $2, 3, 5, 7, 11, 13, 17, 19, 23, 29$
6. Prime Factor	A factor which is a prime number.	The prime factors of 18 are: $2, 3$

Big Factor Hunt

7. Product of Prime Factors	Finding out which **prime numbers multiply** together to make the **original** number. Use a **prime factor tree.** Also known as 'prime factorisation'.	
8. Venn Diagrams	A Venn Diagram shows the **relationship between a group of different things** and how they overlap. You may be asked to shade Venn Diagrams as shown below and to the right. 	

Big Factor Hunt

9. Venn Diagram Notation	∈ means '**element of a set**' (a value in the set) { } means the collection of values in the set. ξ means the '**universal set**' (all the values to consider in the question) **A' means 'not in set A' (called complement)** **A ∪ B means 'A or B or both' (called Union)** **A ∩ B means 'A and B (called Intersection)**	Set A is the even numbers less than 10. A = {2, 4, 6, 8} Set B is the prime numbers less than 10. B = {2, 3, 5, 7} A ∪ B = {2, 3, 4, 5, 6, 7, 8} A ∩ B = {2}

MathsWatch References and Worksheet Links:

28 – Factors, multiples and primes

79/80 – HCF/LCM

78 – products of primes

127 – Venn diagrams

Year 10 Knowledge Organisers

Music

Conventions of Pop: ***Rock 'n' Roll***

1950s and 1960s

Key words

- Forte
- Crescendo
- Harsh Timbre
- Fast Tempo (Allegro)
- Verse/chorus structure
- Solo (Usually E. Guitar)
- Repetition
- Range in Pitch
- Small Vocal Range
- Catchy Melody
- Walking Bassline
- Chords
- Back Beat
- Homophonic
- 4/4 (4 beats in a bar)
- 12 bar Blues
- Primary Chords
- Riff

Instruments

Vocals (usually Male)

Electric Guitar

Bass Guitar

Drum Kit

Backing Vocals

Saxophone

Trumpet

Artists

- Elvis Presley
- Chuck Berry
- Bill Haley and His Comets
- The Beatles (early recordings)

Lyrics and Function

Rock 'n' Roll music's **Lyrics** *light-hearted* are about fun and good times.

Rock 'n' Roll music was enjoyed by the *youth* of the *1950s* and *1960s*.

Rock 'n' Roll music is a *Dance music,* designed to be *Danced to*.

Conventions of Pop: *Pop Ballads*

1970s, 1980s, &, 1990s

Key words

- *Verse/Chorus Structure*
- *Piano* (quiet)
- *crescendo/diminuendo*
- Soft/Clean Timbre
- Slow Tempo (*adagio*)
- Repetition
- Range in Pitch hords
- Broken chords (*arpeggio*)
- Monophonic
- Homophonic Polyphonic
- 3/4 (3 beats in a bar)
- 4/4 (4 beats in a bar)
- Ad lib vocal (Improvised)
- Vocal Riffs

Instruments

- Vocals

  (Vibrato and Melisma/Syllabic)
- Piano
- Strings
- Drum Kit
- Synthesiser
- Saxophone

Artists

1970s • The Carpenters

• Elton John

1980s • Whitney Huston

• Bonnie Tyler

1990s • Sinead O'Connor

Lyrics and Function

Pop Ballads' **Lyrics** focus on the theme of <u>*Love*</u> and <u>*Loss*</u>.

Pop Ballads were commercially successful and continue to sell well today.

Pop Ballads could be <u>*danced to*</u> but also received a lot of radio play as people identified with the emotional lyrics.

All the <u>*musical elements*</u> in a Pop Ballad are <u>*exploited*</u> to <u>*convey emotion*</u>.

Conventions of Pop: ***Rock Anthems***

1970s

1980s

Key words

◊ Subgenre

◊ Harsh/husky Timbre

◊ Riff

◊ Intro

◊ Verse/Chorus structure

◊ Power Chord

◊ Powerful Lyrics

◊ Technology

◊ Repetition

◊ (Small) Range in Pitch

◊ Catchy Melody

◊ Bassline

◊ Chords

◊ Back Beat

◊ Homophonic

◊ 4/4 (4 beats in a bar)

Instruments

- Vocals
- Electric Guitar
- Lead Guitar
- Rhythm Guitar
- Bass Guitar
- Drum Kit
- Amplification

Artists

- Queen
- Guns and Roses
- Bon Jovi
- Led Zeppelin

Lyrics and Function

Rock Anthems' **Lyrics** are *powerful* and often contain themes such as *Freedom* and *Love*.

Rock Anthem Bands and Artist performed in *stadiums* to large numbers of *fans* in the 1970s and 1980s.

Conventions of Pop: *Solo Artists*

1990s, 2000s, 2010s

Key words

◊ Dynamics
◊ Melisma
◊ Vibrato
◊ Growl
◊ Rubarto
◊ Crescendo
◊ Range in Pitch
◊ Catchy Melody
◊ Bassline
◊ Chords
◊ 4/4 (4 beats in a bar)

Instruments

- Solo Vocals
- Backing Vocals
- Piano
- Keyboard
- Strings
- Guitars
- Drum kit
- Use of Technology

Artists

- Madonna
- Michael Jackson
- Kylie Minogue
- Beyoncé
- KT Tunstall
- Adele
- Taylor Swift

Lyrics and Function

The popularity of Solo artists has increased in recent decades.

Fans are interested in both the music and artist's life.

Solo artists often write their own music and take influence from many *genres* when crafting their songs.

Conventions of Pop: *Exam Question*

Your turn!

Extract 1 = *Roll Over Beethoven* by Chuck Berry

Extract 2 = *Misirlou* by Dick Dale

Compare and contrast the two extracts from the Rock 'n' Roll Genre. You may wish to refer to; tempo, dynamics, structure, timbre and any other musical elements you feel are important. [5]

Instruments I can hear

Key words I will use

Structure

Extract 1					
Extract 2					

Written Answer continue on more paper if necessary.

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Year 10 Knowledge Organisers

Photography

GCSE Photography Assessment Objectives

There are 4 Assessment Objectives for GCSE Photography.
Each one is worth a quarter of your final grade.

AO1 - RESEARCH
Develop their ideas through sustained and focused investigations informed by contextual and other sources, demonstrating analytical and critical understanding.
Look at a range of artists and designers, relating their work to your own. Analyse and give opinions on their work.

AO2 - EXPERIMENTATION
Experiment with and select appropriate resources, media, techniques and processes, reviewing and refining their ideas as their work develops.
Experiment with a range of ideas, processes and techniques in Photoshop.

AO3 - RECORDING
Record in visual and/or other forms ideas, observations and insights relevant to their intentions, demonstrating an ability to reflect on their work and progress.
Show your journey. Refine your work and show your progression.

AO4 – FINAL PIECES
Present a personal, informed and meaningful response demonstrating critical understanding, realising intentions and, where appropriate, making connections between visual, written, oral or other elements.
Final pieces. They should reflect A01, A02 and A03.

What makes a good quality photograph?

Clear (in focus)

Interesting composition (layout)

Take photos close up and further away

Colour

Interesting viewpoint

Take more than one photo of the same thing

Interesting angles

Contrast (light vs dark)

Sentence Starters

The main subject in this photographer's work is...

I would describe the photographer's style as...

The composition in this photo...

I like their work because...

Something I don't like about their work is...

The colours this photographer uses...

In my own work I would like to...

I think this is the most original photo because...

The backgrounds in their work are...

This photographer emphasises texture because...

This photographer's work makes me feel...

I would like to take photos similar to this photographer's because...

If I could interview this photographer, I would ask them...

Photography Analysis Word Bank

Visual language – the top 10 things to talk about

Technique	Colour	Composition	Shape	Subject
Light	Media	Mood	Style	Story

Colour	Composition	Mood	Style	Light
Blend	Background	Alive	Abstract	Artificial
Bright	Blurred	Atmospheric	Derivative	Contrast
Clashing	Complex	Calm	Distorted	Dark
Cold	Confused	Delicate	Emotional	Evening
Contrast	Distance	Depressing	Exaggerated	Fierce
Deep	Eye line	Dignified	Exterior	Gentle
Dull	Focus	Disturbing	Fake	Harsh
Glowing	Foreground	Fresh	Fantasy	Hazy
Harmonious	Form	Exciting	Figurative	Intense
Intense	Line	Flamboyant	Impressionistic	Natural
Luminous	Middle ground	Expressive	Landscape	Shady
Mixed	Movement	Humorous	Religious	Shadowy
Monochrome	Near	Imposing	Representational	Warm
Opaque	Perspective	Nostalgic	Still life	
Pale	Scale	Sad	Sketch	
Primary	Shape	Sentimental	Surreal	
Pure	Space	Tranquil	Symbolic	
Secondary	Symmetry			
Tone				
Translucent				
Transparent				
Vibrant				
Warm				

Aperture – The size of the hole which controls how much light is allowed into the camera when taking a photograph. The higher the aperture the smaller the hole (less light) and the lower the aperture the larger the hole (more light).

Subject matter – What is represented in the photograph, a basic breakdown of what can be seen.

Focal point – The part of the photograph that the eye is immediately drawn to.

Over exposure/ under exposure – When too much or too little light has been exposed onto the file. The result of under exposure would be a light and faded image and an over exposed image would be very dark.

Crop – To select an area of an image and remove the surrounding area.

Composition – The arrangement of the subject matter and how they relate to one another within the photograph.

Filter – The image manipulation tools on programmes such as Photoshop.

Lighting/ shadow – Light and shadow can be created with artificial light (lamp/ flash) or natural light (the sun).

Perspective – The position or angle of the shot in relation to the object being photographed.

Depth of field – The area of the image which is in sharp focus.

Rule of thirds – A technique used to create a successful composition. The rule states that the 'focal point' should not be dead centre in the image but either one third from the top/ bottom/ side of the image.

ISO - he light sensitivity of either the film or imaging sensor in the camera.

Year 10 Knowledge Organisers

Psychology

ACADEMY GREAT BARR

Knowledge Organiser

Year 10

Psychology – Cycle 3

Basic outline

Brain stem
Highly developed at birth.
Connects brain to spinal cord.
Autonomic functions.

Cerebellum
Matures late.
Near top of spinal cord.
Co-ordinates sensory and motor.

Thalamus
Deep inside the brain in each hemisphere.
Information hub, receives and then sends signals around brain.

Cortex
Very thin and folded cover.
Thinking and processing.
Frontal, visual, auditory, motor areas in each hemisphere.

The roles of nature and nurture

Roles of nature and nurture
Nature is inherited and nurture is environmental influences on development.

Smoking
Smoking during pregnancy can lead to smaller brains.

Infection
In the womb, German measles can lead to hearing loss.

Voices
Babies learn to recognise mother's voice.

Interaction between nature and nurture
The brain forms due to nature but the environment has a major influence even in the womb.

Piaget's theory

The theory
Changes in thinking (cognition) over time.
Children think differently from adults.

Stages
Different kinds of logical thinking occur at each stage.

Schemas
Mental structures containing knowledge. Schemas become more complex through assimilation and accommodation.

Assimilation
Adding new information to an existing schema.

Accommodation
Receiving new information that changes our understanding so a new schema is formed.

Evaluation

Research evidence
Many studies have been conducted to test Piaget's theory, which has helped improve our understanding of how children's thinking develops.

Real-world application
The theory has helped change classroom teaching so it is now more activity-based.

Extra: The sample
Middle-class Swiss children were used so theory may not be universal.

Conservation

Although appearance changes, quantity stays the same.
Piaget showed younger children can't conserve quantities.
Challenged by 'naughty teddy study'.

McGarrigle and Donaldson's study: Aims
The 'naughty teddy study' aimed to see if a deliberate change in the row of counters would help younger children conserve.

Named study in specification

Method
Children aged 4–6 years.
Two rows of counters, teddy messed up one of them. Child asked if rows were the same.

Results
Deliberate change = 41% conserved.
Accidental change = 68% conserved.
Older children did better than younger ones.

Conclusion
Piaget's method doesn't show what children can do.
This study does show there are still age-related changes.

Evaluation

The sample
Primary school sample from one school, so comparisons between groups may not be valid.

The change was not noticed
Children may appear to conserve because they simply didn't notice the change as they were distracted by the teddy.

Extra: Challenges Piaget
The study shows that Piaget confused young children with his style of questioning. This helps to refine his theory.

Egocentrism

Seeing the world only from one's own point of view.
Piaget tested this with the three mountains task, showing egocentrism up to age 7.
This was challenged by the 'policeman doll study'.

Hughes' study: Aims
The 'policeman doll study' aimed to create a test that would make more sense than Piaget's.

Named study in specification

Method
3½ to 5-year-olds asked to hide a boy doll from two policemen. They were given practice first with one doll.

Results
90% could hide the boy doll away from two policemen.
3-year-olds did less well with a more complex task.

Conclusions
Children aged 4 years are mostly not egocentric.
Piaget underestimated abilities but was right that thinking changes with age.

Evaluation

More realistic
Task made better sense to children and they were given practice so they understood, so a more realistic test of abilities.

Effects of expectations
Unconscious cues from the researcher may have influenced the children's behaviour, so the results lack validity.

Extra: Challenges Piaget
The study shows that Piaget's task confused the children making them appear less able thinkers. This helps to refine his theory.

Stages of cognitive development

Four stages at different ages. Children think differently as their brains mature. Universal order of stages.

Sensorimotor stage
0–2 years, learn to co-ordinate sensory and motor information.
Object permanence develops.

Pre-operational stage
2–7 years, can't think in a consistently logical way (it doesn't 'make sense')
Egocentric and lack conservation.

Concrete operational
7–11 years. At 7 most children can conserve and show less egocentrism.
Logical thinking applied to physical objects only.

Formal operational
11+ years. Children can draw conclusions about abstract concepts and form arguments.

Evaluation

Underestimated children's abilities
Some types of thinking develop earlier than Piaget proposed.

Overestimated children's abilities
Suggested that children 11+ are capable of abstract reasoning but most can't cope with Wason's card sorting task in abstract form.

Extra: Basic idea is correct
Does show children's thinking changes with age so theory is valid.

Application in education

Readiness
Can only teach something when child biologically 'ready'.

Learning by discovery and the teacher's role
Children must play active role, not rote-learn. Teachers should challenge schemas.

Individual learning
Children go through same stages in same order but at different rates.

Application to stages
Sensorimotor – Stimulating sensory environment.
Pre-operational – Discovery learning rather than written work.
Concrete operational – Physical materials to manipulate.
Formal operational stage – Scientific experiments to develop logical thinking.

Evaluation

Very influential
Positive impact on UK education as more child-centered activity in primary schools.

Possible to improve with practice
Thinking can develop at an earlier age if given enough practice, not just when ready.

Extra: Traditional methods may be good
Direct instruction is a better teaching method in some subjects.

Learning styles

What is a learning style?
People differ in how they learn.
Matching teaching to learning style should improve learning.

Verbaliser
Focus on words. Processing by hearing or reading information and talking about it.

Visualiser
Processing information by seeing spatial relationships using diagrams, mind maps, graphs etc.

Kinaesthetic learners
Learning by active exploration, making things, physical activities, etc.

Dweck's mindset theory

The set of assumptions we have (mindset) affects success.
Success is due to effort not talent.

Fixed mindset
Effort won't help because talent is fixed in the genes. Focused on performance.

Growth mindset
Can improve with effort, enjoy challenge. Focused on learning goals.

Dealing with failure
Fixed mindset: Failure indicates lack of talent, so give up.
Growth mindset: Opportunity to learn more and put in more effort.

A continuum
Not simply one or the other (fixed or growth). Depends on the situation.

Evaluation

Research support
Dweck found children taught a growth mindset had better grades and motivation.

Both mindsets involve praise
Praising effort still leads to doing things for approval so can discourage independent behaviour.

Extra: Real-world application
In business, sport, relationships – seeing failure as a lack of effort rather than talent motivates future effort.

The role of praise and self-efficacy

Positive effect of praise
It's a reward. It makes someone feel good so behaviour is repeated.

Praise effort rather than performance
Praising effort enables control. Praising performance is demotivating.

Self–efficacy
Understanding your own abilities. Self–efficacy increases or decreases future success.

Effect of self-efficacy on motivation
Greater effort, persist longer, greater task performance and more resilience if high self-efficacy.

Evaluation

Praise destroys internal motivation
Praise can have opposite effect. Less interested if previously rewarded (Lepper).

Low self-efficacy lowers performance
Research into the stereotype effect shows performance on an IQ test is lowered if reminded of race (Steele and Aronson).

Extra: Practical application
Students criticised for effort performed better on a test than those previously praised (Dweck).

Year 10 Knowledge Organisers

Spanish

7.1G Reutilizar, reducir, reciclar

ahorrar	to save
la basura	rubbish
la bolsa de plástico	plastic bag
el cartón	cardboard
cerrar	to shut, to close,to turn off (tap)
el contenedor	container
en vez de	instead of
intentar	to try to
la lata	tin, can
el malgasto	waste
el papel (reciclado)	(recycled) paper
la papelera	wastepaper basket
la pila	battery
el plástico	plastic
ponerse	to put on (clothes)
los productos químicos	chemicals, chemical products
el proyecto	project
recargable	rechargeable
reciclar	to recycle
reutilizar	to reuse
la Tierra	Earth
tirar	to pull, to throw away
tratar de	to try to
el vidrio	glass

Gramática

Using *me preocupa(n)*

To say 'I am worried/concerned' about something, use *me preocupa*; to say 'we are worried' use *nos preocupa*.

These expressions agree with what you are worried about so if the word is plural, *preocupa* changes to *preocupan*.
Me preocupa el medio ambiente – I'm worried about the environment.
Me preocupan las emisiones de los coches – I'm concerned about emissions from cars.

There are a number of other expressions in Spanish that work in the same way:
me interesa + noun – I'm interested in

me fastidia + noun
me irrita + noun
me molesta + noun
– I'm annoyed about

me importa x – x is/are important to me/matter(s) to me

1	¿Qué te importa más – reutilizar, reducir o reciclar?	Me importa más	reutilizar cosas. reducir el malgasto de recursos. reciclar.	
2	¿Qué haces para reutilizar cosas?	Uso pilas recargables. Reutilizo bolsas de plástico.		
3	¿Qué haces para reducir el malgasto de recursos?	Ahorro energía.	Me pongo un jersey en vez de poner la calefacción. Solo pongo el lavaplatos cuando está lleno.	
		Ahorro agua.	Me ducho en vez de bañarme. Siempre cierro los grifos.	
		Evito el uso	de productos químicos.	
			de combustibles fósiles.	Uso el transporte público. Voy al colegio a pie. Voy en bici.
4	¿Qué haces para reciclar?	Reciclo	las latas. el papel y el cartón. el plástico. el vidrio.	
		Separo	la basura.	

7.1F Protegiendo el medio ambiente

la basura	rubbish
la bombilla (de bajo consumo)	(low-energy) light bulb
el combustible	fuel
combatir	to fight, to combat
la contaminación atmosférica	air pollution
desaparecer	to disappear
el desastre	disaster
desconectar	to disconnect/unplug/switch off
deshacer	to undo
los desperdicios	rubbish, refuse, waste
la especie	species
incluso	even
inquietante	worrying
luchar	to struggle, fight
la medida	measure, means
medioambiental	environmental
el motor	engine
los residuos	refuse, waste, rubbish
salvar	to save

Using 'if' sentences

Gramática

Use 'if' sentences to talk about possibilities in the future.

'If' clause	Main clause
Si + present tense	future tense
Si ***sigues*** *estos consejos,*	***podrás*** *ahorrar 57.000 litros de agua.*
Si + present tense	Immediate future tense (*ir* + *a* + infinitive)
Si ***sigues*** *estos consejos,*	***vas*** *a salvar a uno o más árboles.*

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Using prefixes

When reading or listening to Spanish, watch out for prefixes that can give you a clue as to the meaning of words.

re– often means to do something again:
utilizar (to use) / *reutilizar* (to reuse, to use again)
cargar (to load) / *recargar* (to reload, recharge)

des–, *in–* and *im–* indicate the opposite meaning to that of the original word.
hacer (to do) / *deshacer* (to undo)
justo (fair) / *injusto* (unfair)
posible (possible) / *imposible* (impossible)

7.1H Problemas ecológicos

acercarse a	to approach
el agujero	hole
la aldea	(small) village
alejar	to move (something) further away
alejarse de	to move further away from
amenazar	to threaten
arruinar	to ruin
el atasco	traffic jam, hold-up
el ave (marina) (fem.)	(sea) bird
el calentamiento global	lobal warming
la capa de ozono	ozone layer
el casco	helmet, hull (of ship)
el centenar	about a hundred
la central eléctrica	power station
la circulación	traffic
constituir	to constitute
cortar	to cut, to cut off
el efecto invernadero	greenhouse effect
extender	to spread, to stretch
frenar	to brake, to put a stop to
el humo	smoke
el huracán	hurricane
el incendio	fire
la lluvia	rain
la mancha	stain
la marea negra	oil slick
la muerte	death
el nivel	level
el petrolero	oil tanker
el/la pescador/a	fisherman/fisherwoman
el planeta	planet

A	¿Cuál de estos problemas te parece más importante? ¿Qué opinas de...? ¿Es un problema grave?				¿Por qué?
B	Creo que Me parece que Opino que	el agujero en la capa de ozono el efecto invernadero la deforestación el problema de las mareas negras el problema del tráfico	es importante porque podría...	causar	el cambio climático. huracanes. sequías. el calentamiento global. incendios forestales. contaminación atmosférica. enfermedades pulmonares.
				afectar a	la flora y fauna. las aves marinas. la vida marina. las playas.
				constituir	un riesgo para la salud. un riesgo para la vida de los animales.
				amenazar	el planeta. la vida humana. la vida de los animales.

Using modal verbs to express recommendations and obligations

Modal verbs include *poder* (to be able / can) and *deber* (to have to / must). They are always followed by the infinitive.

Hay riesgo de incendio. Debes ***apagar*** *el cigarillo.*
There's a risk of fires. You must put out your cigarette.

Podemos ***hacer*** *mucho más.*
We can do a lot more.

When used in the conditional, they have slightly different meanings:

Deberías *hacer más para proteger el medio ambiente.*
You **ought** to do more to help the environment.

Podríamos *reciclar las latas y el vidrio.*
We **could** recycle cans and glass.

prever	to foresee
rescatar	to rescue
el riesgo	risk
la salud	health
la selva	tropical forest, jungle
señalar	to indicate
la sequía	drought
vagar	to wander about, to float around
el viento	wind

Year 10 Knowledge Organisers

Design and Technology Y10

Knowledge Organiser AQA Design & Technology 8552

1. Woods

Man-Made Woods

	Description	Uses
Medium density fibreboard (MDF)	•Has a smooth, even surface •Easily machined and painted •Available in water and fire-resistant form •Often veneered or painted to improve its appearance	•Furniture and interior panelling
Chipboard	•Made from chips of wood glued together with urea formaldehyde (glue) •Usually veneered with an attractive hardwood or covered in plastic laminate	•Kitchen and bedroom furniture •Shelving and general DIY Work
Plywood	•A very strong board, constructed of layers of veneer or piles, which are glued together with the grains at 90° to each other •Interior and exterior grades available.	•Furniture making •Boat building and exterior work
Hardboard	•A very cheap particle board •Can have a laminated plastic surface	•Kitchen unit and furniture back panels

Hard Woods

	Description	Uses
Oak	•A very strong, light-brown wood •Open grained •Very hard, but quite easy to work with	•High quality furniture •Beams used in building •Veneers
Mahogany	•Reddish-brown in colour •Easy to work with	•Indoor furniture •Shop fittings •Bars •Veneers
Beech	•A straight- grained hardwood with a fine texture •Light in colour •Very hard but easy to work with •Can be steam bent	•Furniture •Toys •Tool handles
Ash	•Open grained •Easy to work with •Pale cream colour, often stained black •Can be laminated (i.e. sliced into veneers which are glued together)	•Tool handles •Sports equipment •Furniture •Ladders •Veneers

Soft Wood

	Description	Uses
Pine	•Pale-yellow coloured with dark lines and a fine, even texture. •Medium in weight •Stiff and stable •Inexpensive	•Readily available for DIY work •Mainly used for constructional work and simple joinery •Furniture

2. Plastics

Acrylic		Properties: • Hard wearing • Will not shatter • Can be coloured • Bathtubs, School Projects, Display signs
Polypropylene		Properties: •High Impact strength •Softens at 150°C •Can be Flexed many times without breaking •School chairs, Crates
High Impact Polystyrene (HIPS)		Properties: •Light but strong •Widely available in sheets •Used for casings of electronic products
Polythene (LDPE)		Properties: • Weaker and softer than HPDE. • Lightweight • Carrier Bags + Squeezy Bottles
Polythene (HDPE)		Properties: •Stiff strong plastic •Used for pipes and bowls •Buckets
Urea formaldehyde		Properties: •Colourless plastic •Can be coloured •Door and cupboard handles, Electrical fittings

3. Material Properties

Strength
The ability of a material to stand up to forces being applied **without it bending, breaking, shattering or deforming in any way**.

Elasticity
The ability of a material to **absorb force and flex in different directions, returning to its original position.**

Ductility
The ability of a material to **change shape (deform) usually by stretching along its length.**

Malleability
The ability of a material to be **reshaped in all directions without cracking.**

Hardness
The ability of a material to **resist scratching, wear and tear and indentation.**

Toughness
A characteristic of a material that **does not break or shatter when receiving a blow or under a sudden shock.**

3. Metals

Aluminium	Properties: •Light Weight •Light grey in colour •Can be polished to a mirror like appearance •Rust resistant	
Mild Steel	Properties: •Heavy •Dark grey in colour •Rusts very quickly if exposed	
Stainless Steel	Properties: •Heavy •Shiny appearance •Very resistant to wear / rust.	
Cast Iron	Properties: •Re melted pig iron with some quantities of other metals •Strong in compression. •Brittle	
Copper	Properties: •Reddish brown metal. •Soft •Excellent conductor of heat and electricity	
Brass	Properties: •Yellow metal •Hard •Alloy	

4. Composites

Carbon Fibre	GRP Fibreglass
Expensive in comparison to other materials. Very good strength to weight ratio. Used in the manufacture of high end sports cars and sports equipment. 	GRP is composed of **strands of glass which are woven to form a flexible fabric. The fabric is normally placed in a mould and polyester resin is added.** **Glass reinforced plastic is lightweight** and has **good thermal insulation properties.** It has a **high strength to weight ratio** 

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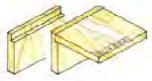
1: Joining Methods

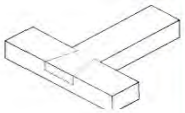
Wood joints can be either permanent of temporary depending on the type and if glue is used.

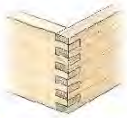
Permanent:	Temporary:
When we do not want to take the pieces apart again	When we will, or might need to take pieces apart again
Glues, welding, rivets	Screws, bolts, nails

1.1Wood joints


Lap Joint

Mortise + Tennon Joint


Dovetail Joint


Finger Joint


Dowel Joint

2. Scales of Production

<u>One off</u>: when you make a unique item
<u>Batch</u>: when you make a few/set amount
<u>Mass</u>: when you make thousands
<u>Continuous</u>: open ended production

3. Adhesives

<u>P.V.A.</u> – Poly Vinyl Acetate – best for joining 2 pieces of wood together
<u>Epoxy</u> – a *thermosetting* resin that can be used to bond most types of material
<u>Contact Adhesive</u> – a glue type that creates a tacky bond on both surfaces to be joined. It can be used with most materials.

4: Materials

<u>4.1 Woods:</u>	
Hardwoods:	Softwoods:
Beech Oak Ash	Scots Pine Cedar Spruce

<u>4.2 Engineered Boards</u>
Engineered boards are manmade materials usually made by mixing wood chips and glues to make wooden sheets.
Examples: Medium Density Fibreboard (MDF) Chipboard, Plywood and Hardboard

4.3 Plastics	
Plastics are made of polymers, and are mostly refined from oil. There are 2 main categories:	
Thermoplastics	Thermosetting plastics
Acrylic **Polypropylene (PP)** **High Impact Polystyrene (HIPS)**	Urea Formaldehyde Melamine Formaldehyde Epoxy Resin

<u>4.4 Metals</u>	
Metals are hard and usually shiny, containing one or more elements dug and refined from the ground	
Ferrous metals are any metal that contains iron and will rust	Non-Ferrous metals do not contain iron and will not rust
Alloys are metals made from a mix of 2 metals – brass is made of copper and zinc.	

***Composite** materials* are a mix of 2 different types of material to get the best qualities from each – eg: GRP (Glass Reinforced Plastic)

5: TOOLS


Try square


Bench Hook


Vice


PVA Glue


Router Table


Mallet


Laser Cutter


Chisel


Tenon Saw

6: Surface Finishes

Finishing is usually one of the last stages of making a project. It will usually involve sanding and applying a surface coating to **protect** your material and **improve its visual appearance.**

<u>Some examples:</u>
Paint, Stain, Varnish, Oil, Danish Oil, Wax, Polish & Dip Coating.

7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

CAD	Computer Aided Design
CAM	Computer Aided Manufacture
CNC	Computer Numerical Control

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1. Paper

Type	Description and uses
Layout paper	• lightweight, thin white paper • used for initial ideas • takes colour media well • low cost
Tracing paper	• thin, translucent paper • making copies of drawings • high cost
Cartridge paper	• good quality white paper • available in different weights • general purpose work • can be used to make simple models • medium cost
Bleedproof paper	• smooth, hard paper • used with water-based and spirit-based felt-tip pens • medium cost
Grid paper	• printed square and isometric grids in different sizes • a guide for quick sketches and working drawings • low cost

2. Selection of materials or components

When selecting materials and components considering the factors listed below:

- Functionality: application of use, ease of working
- Aesthetics: surface finish, texture and colour.
- Environmental factors: recyclable or reused materials, product mileage.
- Availability: ease of sourcing and purchase.
- Cost: bulk buying.
- Social factors: social responsibility.
- Cultural factors: sensitive to cultural influences.
- Ethical factors: purchased from ethical sources such as FSC.

What is the FSC? http://www.fsc-uk.org/en-uk/about-fsc/what-is-fsc/fsc-principles

3. Boards

Type	Description and uses
Corrugated card	• strong and lightweight • used for packaging protection and point of sale stands • available in different thicknesses
Duplex board	• large foam-based board • different finishes available including metallic and hologrammatic • used for food packaging, e.g. take-away pizza boxes
Foil lined board	• quality cardboard with a aluminium foil lining • ideal for ready made meals or take away meal cartons • The foil retains the heat and helps keep the food warm
Foam core board	• very light, very stiff and very flat. • It has a white, rigid polystyrene foam centre, with smooth white paper laminated onto both faces. • It is easy to cut with a knife, a mount cutter or on a wall cutter • great for modelling
Ink jet card	• Has been treated so that it will give a high quality finish with inkjet ink • available in matt and gloss
Solid white board	• top quality cardboard made from quality bleached wood pulp. • used for hard backed books and more expensive items • excellent print finish

4. Paper and Boards- Stock sizes and weights

Paper and board is available in sizes from A0 (biggest) to A7 (smallest). The most common size is A4.
Each size is half the one before, eg A4 is half the size of A3.
They are also sold by weight: GSM – grams per square metre.

Card thickness or calliper is traditionally measured in **Microns**. 1000 **Microns** = 1mm, so the higher the value, the thicker the **card** or paper.

5. Properties of paper and boards.

Type	Weight or thickness	Uses	Relative cost (10= high)
Newsprint	50gsm	Newspapers	1
Layout Paper	60gsm	Sketches and tracing	3
Tracing Paper	70 gsm	Tracing	4
Sugar Paper	90gsm	Cheap mounting work	2
Inkjet/Photo paper	150-230gsm	Photos/Presentations	9
Board (Card)	230-750 microns	Model-making	5
Mount Board	230-1000 microns	Model-making, High picture quality mounting	9
Corrugated Card	3000-5000 microns	Packaging protection	5

7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

GSM	Grams per Square Metre
Microns	Thickness of paper or card. 1000microns =1mm thickness

Knowledge Organiser AQA Design & Technology 8552

1. Fabrics

Natural Fabrics

Cotton	Soft, good absorbency, prints well, machine washable, strong breathable	Origins from the Cotton Plant.	Uses: Jeans, towels, Shirts, dresses, underwear
Wool	High UV protection, flameproof, breathable, durable insulating	Origins from Sheep.	Uses: Jumpers, Coat, blankets
Silk	Smooth, Soft, Strong	Origins from the silk worm.	Uses: Wedding dresses, lingerie.
Linen	Strong, cool in hot weather	Origins from the flax plant	Uses: Trousers, tops.
Leather/Suede	Strong, hardwearing, durable.	Origins from the skin of animals, mainly cows.	Uses: Jackets, Trousers, Shoes.

Synthetic fabrics

Polyester	Durable, wrinkle resistant, stain resistant	Uses: Shirts, jackets. Also used in safety belts, conveyor belts and tyre reinforcement.
Polyamide (Nylon)	Durable, high abrasion resistance	Uses: Sportswear, carpets.
Elastane (Lycra)	Stretchy, durable, high stain resistance	Uses: Sportswear, Swimwear, tights.
Viscose	Soft, comfortable, absorbent, easily dyed.	Uses: Dresses, linings, shorts, shirts, coats, jackets and outerwear.
Acrylic	Absorbent, retains shape after washing, easily dyed, resistance to sunlight.	Uses: Jumpers, tracksuits, linings in boots.

1. Fabrics

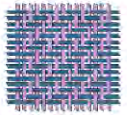
Blended and mixed Fabrics

These fabrics take on the positive characteristics of their combinations

Cotton/Polyester	Easy care and crease resistant	Uses: School shirts.

2. Fabric Construction

Woven

Plain Weave	Extremely strong and hard wearing	
Twill Weave	Extremely high strength and abrasion resistant.	

Knitted

Knitted fabrics	Stretchy, soft and comfortable.	

Non-Woven

Bonded Fabrics	These are webs of fibres held together by glue or stitches.	
Felted Fabrics	Felt is made by combining pressure, moisture and hear to interlock a mat of wool fibres.	

3. Care Labels


Washing Label- will usually have a max. temp number included


Hand Wash only


Do not wring out

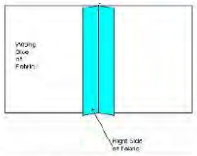
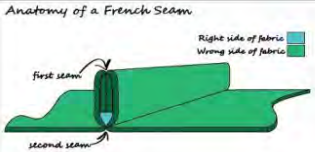
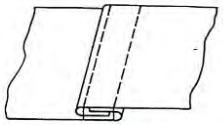

Tumble Dry


Iron on low heat. The more dots the higher the heat setting


Do not bleach

Knowledge Organiser AQA Design & Technology 8552

1. Construction Techniques

Open seam	This is used as the main method for constructing textile products. It is normally finished with overlocking to neaten the edges and prevent fraying.	
French Seam	This seam is used on delicate fabrics that can not be overlocked. It is generally used within lingerie.	
Machine and Fell Seam	Very strong double stitched seam for heavy fabrics. Commonly used on jeans.	
Overlocking	Used to neaten seams to prevent fraying. Generally hidden on the inside of a product.	
Binding	Used to finish a curved edge on a product, where over-locking is not suitable.	

2. Decorative Techniques


Applique


Hand Embroidery


Beads & Sequins


Heat Transfer


Gathers


Buttons

Tucks


Tie Dye

Batik


Pin Tucks

3. Equipment

Quick unpick


Pins


Fabric Shears

Sewing Machine


Ironing Board


Tape Measure

Overlocker

Sewing threads


Iron

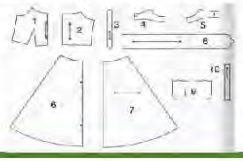
Needle


Embroidery Scissors

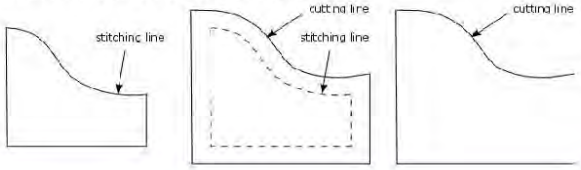
Pinking Shears

4. Key Terminology

Pattern
This is the term given to a paper template to aid in the cutting out of fabric for accurate construction.



Seam Allowance
This is usually a 1cm 'boarder' around your pattern to allow for construction to be the correct size.



Right Side
This is the 'correct' side of the fabric that you wish to see.

Wrong Side
This is the side of the fabric that you do not wish to see.

Pressing
This is the term given when ironing your product; e.g. press your seams open, would refer to when an open seam is sewn and they need to pressed outwards to give a flat finish.

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1. CAD – Computer Aided Design

Advantages of CAD	Disadvantages of CAD
Designs can be created, saved and edited easily, saving time	CAD software is complex to learn
Designs or parts of designs can be easily copied or repeated	Software can be very expensive
Designs can be worked on by remote teams simultaneously	Compatibility issues with software
Designs can be rendered to look photo-realistic to gather public opinion in a range of finishes	Security issues - Risk of data being corrupted or hacked
CAD is very accurate	CAD Software
CAD software can process complex stress testing	

2. CAM – Computer Aided Manufacturing

Advantages of CAM	Disadvantages of CAM
Quick – Speed of production can be increased.	Training is required to operate CAM.
Consistency – All parts manufactures are all the same.	High initial outlay for machines.
Accuracy – Accuracy can be greatly improved using CAM.	Production stoppage – If the machines break down, the production would stop.
Less Mistakes – There is no human error unless pre programmed.	Social issues . Areas can decline as human jobs are taken.
Cost Savings – Workforce can be reduced.	


Laser Cutter


Robots


Barcode Scanner


AGV – Automated Guided Vehicle

3: Production Techniques

3.1 Flexible Manufacturing Systems (FMS) : involves an assembly of automated machines commonly used on short-run batch production lines where the products frequently change.

3.2 Lean Manufacturing: It aims to manufacture products just before they are required to eliminate areas of waste including:

- Overproduction
- Waiting
- Transportation
- Inappropriate processing
- Excessive inventory
- Unnecessary motion
- Defects

3.3 Just In Time (JIT) : Items are created as they are demanded. No surplus stock of raw material, component or finished parts are kept.

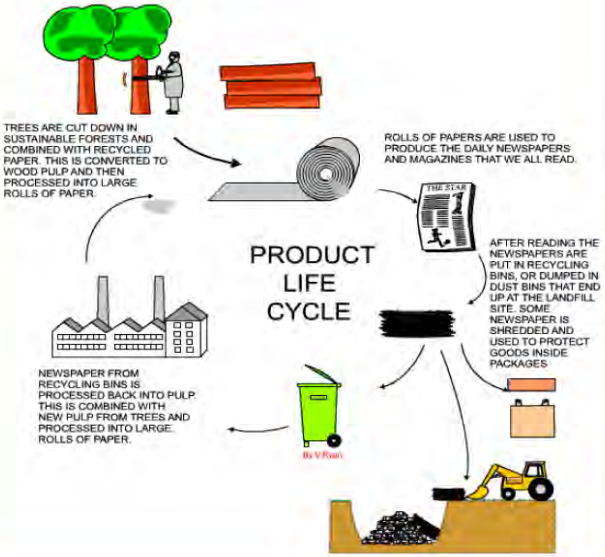
Advantages of JIT	Disadvantages of JIT
No warehousing costs	Reliant on a high quality supply chain
Ordered secured before outlay on parts is required	Stock is not available immediately off-the-shelf
Stock does not become obsolete, damaged or deteriorated	Fewer benefits from bulk purchasing

4. Scales of Production

One off: when you make a unique item
Batch: when you make a few/set amount
Mass: when you make thousands
Continuous: open ended production

5: Informing Design Decisions

5.1 Planned obsolescence - Planned obsolescence is when a product is deliberately designed to have a specific life span. This is usually a shortened life span.
5.2 Design for maintenance - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.
5.3 Disposability – Some products are designed to be disposable.
5.4 Product Lifecycle -



7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

CNC	Computer Numerical Control
EPOS	Electronic Point Of Sale (Barcodes)

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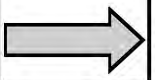
1: Mechanical Devices - Motion

There are four types of motion:

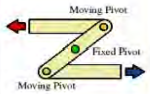
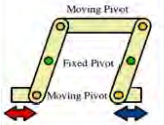
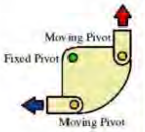
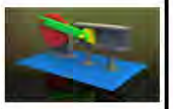
Linear Motion is movement in one direction along a straight line.		
Oscillating Motion This motion is similar to reciprocating motion, but the constant movement is from side to side along a curved path.		
Rotary Motion Examples of circular motion include a ball tied to a rope and being swung round in a circle		
Reciprocating Motion, this is repetitive up-and-down or back-and-forth linear motion		

2: Mechanical Devices – Levers

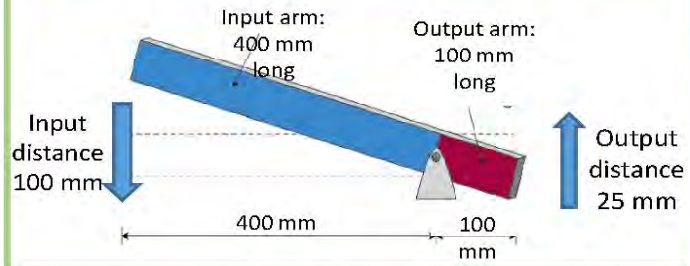
There are three classes of levers.

Class One A class one lever has its input on one side of the fulcrum and its output on the other.		
Class Two A class two lever has its input at one end of the lever, its output in the middle and fulcrum at the other end.		
Class Three A class three lever has its output at one end of the lever, its fulcrum at the other with its input in the middle.		

3: Mechanical Devices – Linkages

Reverse motion linkage	The reverse motion linkage changes the direction of the input motion so that the output travels in the opposite direction. If the input is pulled the output pushes and vice versa. It uses a central bar held in position with a fixed pivot (fulcrum) that forces the change in direction and two moving pivots which are connected to the input and output bars.	
Parallel motion or push/ pull linkage	The push/pull linkage maintains the direction of the input motion so that the output travels in the same direction. If the input is pulled the output is pulled and so on. It uses three linking bars, four moving pivots and two fixed pivots.	
Bell crank linkage	The bell crank linkage changes the direction of the input motion through 90 degrees. It can be used to change horizontal motion into vertical motion or vice versa. It uses a fixed pivot and two moving pivots.	
Crank and slider	The crank and slider linkage changes rotary motion into reciprocating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots to push and pull a slider along a set path.	
Treadle linkage	The treadle linkage changes rotary motion into oscillating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots and a further fixed pivot to create a windscreen wiper motion.	

4: How to work out a levers distance of travel



Output ÷ Input x Input distance = Output distance

100 ÷ 400 x 100 = 25 mm

5: How to work out the Mechanical Advantage

Or use the following formula:

MA = Load = 300N = 3
Effort 100N 1

This is written as 3:1 or just MA of 3

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1: Forces and Stresses

Force	Description	A fair test for each force/stress.	How a material / object can be adapted to resist	Examples
Tension	Forces pulling in opposite directions.	Apply the same weight to each material and suspended in the same manner.	Concrete can have steel bars inserted to reinforce.	
Compression	Forces that are trying to crush or shorten.	Insert materials into a vice/clamp and apply the same amount of twists to the handle.	Composite panels can have a honeycomb structure sandwiched in the middle to resist.	
Bending	Flexing force	Apply the same weight to the material.	Steel beams have an I profile to resist bending.	
Torsion	Twisting force.	Use clamps & stands to hold the materials and turn in opposite directions at the same angle.	The diagonals on a tower crane help the structure against torsion.	
Shear	A strain produced when an object is subjected to opposing forces.	Place the material between a tool that works in opposite directions. e.g. Shears	Bolts are hardened and have unthreaded shanks to help stop shearing.	

2. Improving functionality of materials

Process	Description	Result	Example	Visual Example
Lamination	Layering of thin materials	Depending on the direction of lamination it can make boards stiffer or actually more flexible	Plywood: Laminations at 90 degrees to each other - Rigid Flexi-ply: laminations all the same direction - Bendy	
Bending / Folding	Folding a 90 degree edge on sheet metal / plastic	Makes the panel more rigid	Body panels on cars	
Webbing	Modern polymer fabrics woven together	Extremely strong and durable fabric	Seat belts	
Fabric interfacing	A strengthening material added to the unseen face of a fabric	Adds strength / shape	Shirt collars	

1: The Modification of properties for specific purposes

Process	Material	Purpose
Seasoning	Timber	Removes the moisture content so that the timber will not shrink, warp and twist
Annealing (heating)	Copper	Softens the copper to make it more malleable
Addition of Stabilisers	PVC	Stops plastic become brittle with exposure to the sun

Timber being seasoned in a kiln

Copper bowl being annealed

Metal compounds (stabilisers) are added to PVC for UV protection

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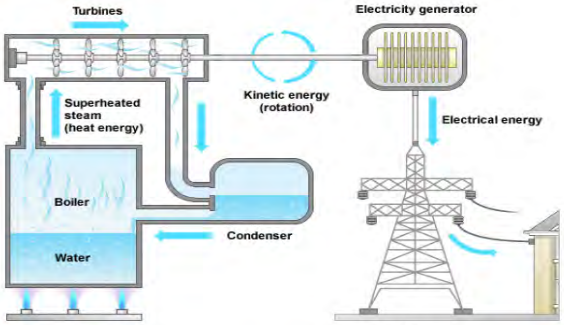
Energy Types
1. Fossil Fuels – Non-renewable energy

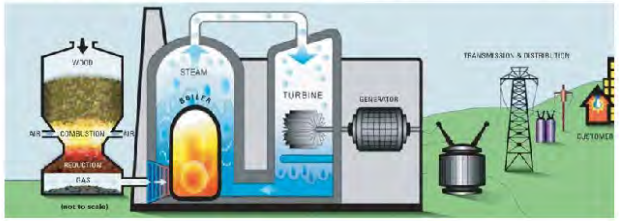


In a thermal power station fuel such as coal, oil or gas is burned in a furnace to produce heat - chemical to heat energy.

- this heat is used to change water into steam in the boiler.
- the steam drives the turbine - heat to kinetic energy
- this drives the generator to produce electricity - kinetic to electrical energy.

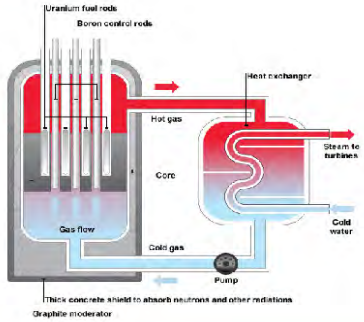
Some experts believe that fossil fuels will run out in our lifetime.

Energy Types 2. Biomass Energy –Renewable Energy



Biomass is an industry term for getting energy by burning wood, and other organic matter. Burning biomass releases carbon emissions, but has been classed as a renewable energy source in the EU and UN legal frameworks, because plant stocks can be replaced with new growth.

Energy Types
3. Nuclear Energy – Renewable energy



The main nuclear fuels are **uranium** and **plutonium**. In a nuclear power station nuclear fuel undergoes a controlled chain reaction in the reactor to produce heat - nuclear to heat energy.

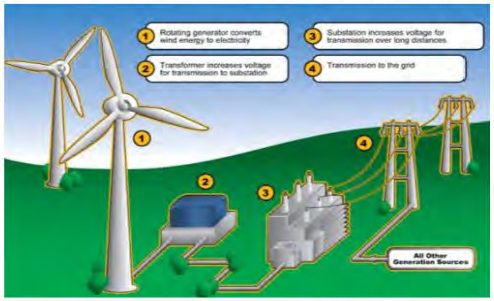
- heat is used to change water into steam in the boiler.
- the steam drives the turbine (heat to kinetic energy)
- this drives the generator to produce electricity - kinetic to electrical energy.

Energy Types
8.Batteries

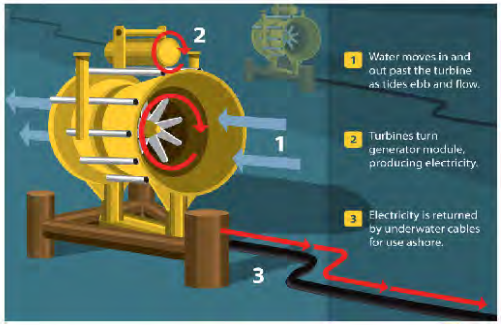
Alkaline batteries are the most common type of domestic batteries, they are disposable but contain chemicals that are bad for the environment. Fortunately more and more battery recycling banks are appearing now where most of the battery can be reused.

Rechargeable batteries are better for the environment and more economical in the long run (High initial purchase price). Their lifespan decreases with every charge.

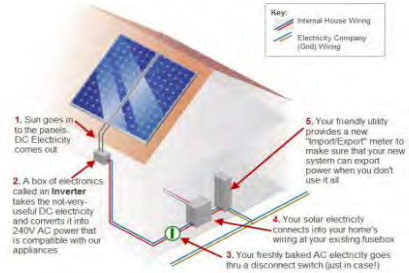
Energy Types
4. Wind Energy – Renewable Energy



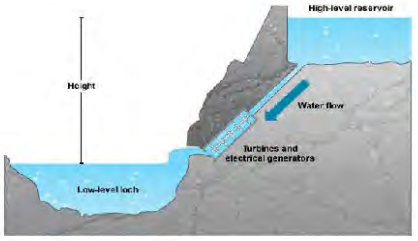
6. Tidal Energy – Renewable Energy



5. Solar Energy – Renewable Energy



7. Hydroelectricity – Renewable Energy



- In a hydroelectric power station water is stored behind a dam in a reservoir. This water has gravitational potential energy.
- The water runs down pipes (potential to kinetic energy) to turn the turbine
- The turbine is connected to a generator to produce electricity (kinetic to electrical energy).

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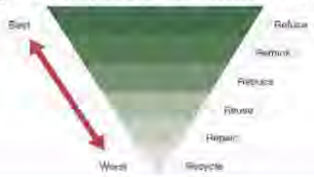
The 6 R's

The 6 Rs are an important checklist. They are used by designers to reduce the environmental impact of products. They can also be used to evaluate the environmental impact of other products.
The **hierarchy of sustainability** places the strategies that are best for the planet about those that have a greater negative impact on the environment.



1. Refuse

The first stage in the process is to ask whether the proposed product, part, purchase or even journey is required at all. Asking the question 'Is it really necessary?' can play a major role in reducing the demand on materials. Simply not using something saves 100% of what you have chosen not to use.
Example include:

- Using your own carrier bag rather than purchasing a new one.
- Walking or cycling to school instead of being driven.
- Not using products such as some pesticides that are known to be harmful to the environment.
- Not eating (or using) products that are over-farmed, over-fished or on the endangered list.

2. Rethink

Consumers have a growing number of choices to make about where and on what they spend their income. Greener and more sustainable options are not always the cheapest or the best, but making informed decision and rethinking ones spending power can play a huge part in conserving resources.
Deciding on the design of a product, e.g. the materials being used in its production, will directly affect its sustainability.
The types of questions designers need to ask are:

- Are the materials locally sourced?
- Are they sustainably produced?
- Is it essential to use this material, of which there is a finite supply?

By rethinking how the product is likely to be made, the product can often be redesigned in a more responsible way.

3. Reduce

Reduction is often the result of having re-thought a design or action. Materials and energy are saved due to efficient manufacturing practices and the use of clever design, incorporating sustainable materials.

- Modern materials that are lighter and stronger than traditional ones have contributed to the miniaturisation of products, saving material and energy in manufacture and use.
- Reducing the complexity or number of parts a product uses and reducing the number of different materials in a product makes recycling easier.
- In factories, schools and hotels, fitting motion sensitive lighting and smart heating systems can significantly reduce energy usage.
- Many large companies employ staff to conduct 'energy walks' to turn off unused appliances and lights and to ensure windows and doors are shut to conserve heat.

4. Reuse

Reusing products multiple times for the same purpose is also known as **primary recycling.** Reusing a product in a different way from the one it was designed for is known as **secondary recycling.**
The classic glass milk bottle is reused many times before it reaches the end of its useful life, as which point it is recycled. A plastic milk bottle, however, is intended to be used only one, although it can have many different subsequent uses.
Donating to and buying from charity shops extends the life of products and in recent years there has been a resurgence of in products having second lives, thanks to websites such as eBay, Freecycle or Gum tree.

It is also becoming popular for furniture and other household items to be **upcycled** with a coat of paint and some minor repairs or adaptations, extending their useful life by many years.

5. Repair

Being able to repair a product when it is broken or worn is a way of extending its life and delaying the purchase of a new one. Repairing is a positive option over replacement as it means that only some parts of the product are replaced. This creates jobs for skilled people who conduct repairs and stimulates a spare parts market.
Unfortunately, repairing products has become harder over years. Growing number of products are not design to be repaired. There are a number of reasons why items may be designed this way, but it is usually because they are cheaper to replace than repair. Some products, especially modern electronic products, are designed to last only a few years as technology dates quickly and older products will be superseded by newer, faster, more efficient models. This is called **planned obsolescence.**

6. Recycle

Tertiary recycling, although a very important stage, is lower down the hierarchy of preferred options because most materials that are recycled this way tend to be of lower quality than the original material. It takes a lot of energy to recycle materials.
This form of recycling requires the reprocessing of the material and in many cases involves chemicals and/or heat to recover the recycled materials. In an ideal world, tertiary recycling would remove all recyclable materials from our household waste so that only biodegradable materials would be left. Only very few parts of the world are set up to cope with this level of processing.

7. Sustainability

Our planet has to provide all of our basic human needs, such as food, shelter and warmth.
Designers now have a much better understanding of which materials are sustainable and which are not. The general principle is that resources fall into two categories:
Finite resources – are ones which are in limited supply or cannot be reproduced.
Non-finite resources – are ones which are in abundant supply and are unlikely to be exhausted.

8. Recyclable materials

Once all useful and recyclable materials are removed, the majority of the remaining waste is organic matter and can be processed in one of two ways; **'Recover'** or **'Rot'**. Food waste and garden waste can be processed at a high temperature and turned into compost. The waste can also be buried in **landfill** sites where the resulting methane gas from the rotting matter is collected and burned and used to generate heat or electricity in the same way.

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Designer Name	Facts	Logo	Examples
Coco Chanel	**Gabrielle Bonheur "Coco" Chanel** (19 August 1883 – 10 January 1971) was a French fashion designer and businesswoman. She was the founder and namesake of the Chanel brand.	CHANEL	
Alexander McQueen	**Lee Alexander McQueen**, CBE (17 March 1969 – 11 February 2010), known professionally as **Alexander McQueen**, was a British fashion designer and couturier. He is known for having worked as chief designer at Givenchy from 1996 to 2001 and for founding his own Alexander McQueen label.		
Vivienne Westwood	**Dame Vivienne Isabel Westwood** DBE RDI (born 8 April 1941) is a British fashion designer and businesswoman, largely responsible for bringing modern punk and new wave fashions into the mainstream.	Vivienne Westwood	
Harry Beck	**Henry Charles Beck** (4 June 1902 – 18 September 1974), known as **Harry Beck**, was an English technical draughtsman best known for creating the present London Underground Tube map in 1931.	HARRY BECK 1902–1974 Designer of the London Underground map was born here	
Norman Foster	**Norman Robert Foster, Baron Foster of Thames Bank**, OM, HonFREng (born 1 June 1935) is a British architect whose company, Foster + Partners, maintains an international design practice famous for high-tech architecture.	NORMAN FOSTER	

Designer Name	Facts	Logo	Examples
Marcel Breuer	**Marcel Lajos Breuer** (22 May 1902 – 1 July 1981) was a Hungarian-born modernist, architect, and furniture designer. Breuer extended the sculptural vocabulary he had developed in the carpentry shop at the Bauhaus into a personal architecture	Marcel Breuer	
Sir Alec Issigonis	**Sir Alexander Arnold Constantine Issigonis**; 18 November 1906 – 2 October 1988) was a British-Greek designer of cars, widely noted for the ground-breaking and influential development of the Mini, launched by the British Motor Corporation (BMC) in 1959.		
William Morris	**William Morris** (24 March 1834 – 3 October 1896) was an English textile designer, poet, novelist, translator, and socialist activist. Associated with the British Arts and Crafts Movement, he was a major contributor to the revival of traditional British textile arts and methods of production.	THE ORIGINAL MORRIS & Co	
Mary Quant	**Dame Barbara Mary Quant, Mrs Plunket Greene**, (born 11 February 1934) is a Welsh fashion designer and British fashion icon She became an instrumental figure in the 1960s London-based Mod and youth fashion movements.	MARY QUANT	
Louis Comfort Tiffany	**Louis Comfort Tiffany** (February 18, 1848 – January 17, 1933) was an American artist and designer who worked in the decorative arts. He is best known for his work in stained glass.	LOUIS COMFORT TIFFANY	
Philippe Starck	**Philippe Starck** (born January 18,. 1949) is a French designer known since the start of his career in the 1980s for his interior, product, industrial and architectural design including furniture	S+ARCK	

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Designer Name	Facts	Logo	Examples
Raymond Templier	**RAYMOND TEMPLIER** (1891 - 1968) like many of his contemporaries in jewelry, was born to a family with a long tradition as jewelers.		
Gerrit Rietveld	**Gerrit Thomas Rietveld**; 24 June 1888 – 25 June 1964) was a Dutch furniture designer and architect. One of the principal members of the Dutch artistic movement called De Stijl, Rietveld is famous for his Red and Blue Chair.	Gerrit Rietveld	
Charles Rennie Macintosh	**Charles Rennie Mackintosh** (7 June 1868 – 10 December 1928) was a Scottish architect, designer, water colourist and artist. His artistic approach had much in common with European Symbolism. His work was influential on European design movements such as Art Nouveau and Secessionism.	CHARLES RENNIE MACKINTOSH	
Aldo Rossi	**Aldo Rossi** (3 May 1931 – 4 September 1997) was an Italian architect and designer who achieved international recognition in four distinct areas: theory, drawing, architecture and product design. He was the first Italian to receive the Pritzker Prize for architecture.	ALDO ROSSI	
Ettore Sottsass	**Ettore Sottsass** (14 September 1917 – 31 December 2007) was an Italian architect and designer during the 20th century. His work included furniture, jewellery, glass, lighting, home objects and office machine design, as well as many buildings and interiors.	SOTTSASS	

Company Name	Facts	Logo	Examples
Alessi	**Alessi** is a housewares and kitchen utensil company in Italy, producing everyday items from plastic and metal, created by famous designers.	ALESSI	
Apple	**Apple Inc.** is an American multinational technology company headquartered in Cupertino, California that designs, develops, and sells consumer electronics, computer software, and online services.		
Braun	**Braun GmbH** formerly **Braun AG**, is a German consumer products company based in Kronberg. From 1984 until 2007, Braun was a wholly owned subsidiary of The Gillette Company, which had purchased a controlling interest in the company in 1967.	BRAUN	
Dyson	**Dyson Ltd.** is a British technology company established by James Dyson in 1987. It designs and manufactures household appliances such as vacuum cleaners, hand dryers, bladeless fans, heaters and hair dryers.	dyson	
GAP	**The Gap, Inc.** commonly known as **Gap Inc.** or **Gap**, (stylized as **GAP**) is an American worldwide clothing and accessories retailer.	GAP	
Primark	**Primark** known as **Penneys** in the Republic of Ireland) is an Irish clothing and accessories company which is a subsidiary of AB Foods, and is headquartered in Dublin.	PRIMARK	
Under Armour	**Under Armour, Inc.** is an American company that manufactures footwear, sports and casual apparel.		
Zara	**Zara** is a Spanish clothing and accessories retailer based in Arteixo, Galicia. It is the main brand of the Inditex group, the world's largest apparel retailer.	ZARA	

Year 10 Knowledge Organisers

Design and Technology Y11

Knowledge Organiser AQA Design & Technology 8552

1. Woods

Man-Made Woods

	Description	Uses
Medium density fibreboard (MDF)	•Has a smooth, even surface •Easily machined and painted •Available in water and fire-resistant form •Often veneered or painted to improve its appearance	•Furniture and interior panelling
Chipboard	•Made from chips of wood glued together with urea formaldehyde (glue) •Usually veneered with an attractive hardwood or covered in plastic laminate	•Kitchen and bedroom furniture •Shelving and general DIY Work
Plywood	•A very strong board, constructed of layers of veneer or piles, which are glued together with the grains at 90° to each other •Interior and exterior grades available.	•Furniture making •Boat building and exterior work
Hardboard	•A very cheap particle board •Can have a laminated plastic surface	•Kitchen unit and furniture back panels

Hard Woods

	Description	Uses
Oak	•A very strong, light-brown wood •Open grained •Very hard, but quite easy to work with	•High quality furniture •Beams used in building •Veneers
Mahogany	•Reddish-brown in colour •Easy to work with	•Indoor furniture •Shop fittings •Bars •Veneers
Beech	•A straight- grained hardwood with a fine texture •Light in colour •Very hard but easy to work with •Can be steam bent	•Furniture •Toys •Tool handles
Ash	•Open grained •Easy to work with •Pale cream colour, often stained black •Can be laminated (i.e. sliced into veneers which are glued together)	•Tool handles •Sports equipment •Furniture •Ladders •Veneers

Soft Wood

	Description	Uses
Pine	•Pale-yellow coloured with dark lines and a fine, even texture. •Medium in weight •Stiff and stable •Inexpensive	•Readily available for DIY work •Mainly used for constructional work and simple joinery •Furniture

2. Plastics

Acrylic		*Properties:* • *Hard wearing* • *Will not shatter* • *Can be coloured* • *Bathtubs, School Projects, Display signs*
Polypropylene		*Properties:* *•High Impact strength* *•Softens at 150°C* *•Can be Flexed many times without breaking* *•School chairs, Crates*
High Impact Polystyrene (HIPS)		*Properties:* *•Light but strong* *•Widely available in sheets* *•Used for casings of electronic products*
Polythene (LDPE)		*Properties:* • *Weaker and softer than HPDE.* • *Lightweight* • *Carrier Bags + Squeezy Bottles*
Polythene (HDPE)		*Properties:* *•Stiff strong plastic* *•Used for pipes and bowls* *•Buckets*
Urea formaldehyde		*Properties:* *•Colourless plastic* *•Can be coloured* *•Door and cupboard handles, Electrical fittings*

3. Material Properties

Strength
The ability of a material to stand up to forces being applied **without it bending, breaking, shattering or deforming in any way.**

Elasticity
The ability of a material to **absorb force and flex in different directions, returning to its original position.**

Ductility
The ability of a material to **change shape (deform) usually by stretching along its length.**

Malleability
The ability of a material to be **reshaped in all directions without cracking.**

Hardness
The ability of a material to **resist scratching, wear and tear and indentation.**

Toughness
A characteristic of a material that **does not break or shatter when receiving a blow or under a sudden shock.**

3. Metals

Aluminium	*Properties:* *•Light Weight* *•Light grey in colour* *•Can be polished to a mirror like appearance* *•Rust resistant*	
Mild Steel	*Properties:* *•Heavy* *•Dark grey in colour* *•Rusts very quickly if exposed*	
Stainless Steel	*Properties:* *•Heavy* *•Shiny appearance* *•Very resistant to wear / rust.*	
Cast Iron	*Properties:* *•Re melted pig iron with some quantities of other metals* *•Strong in compression.* *•Brittle*	
Copper	*Properties:* *•Reddish brown metal.* *•Soft* *•Excellent conductor of heat and electricity*	
Brass	*Properties:* *•Yellow metal* *•Hard* *•Alloy*	

4. Composites

Carbon Fibre	GRP Fibreglass
Expensive in comparison to other materials. Very good strength to weight ratio. Used in the manufacture of high end sports cars and sports equipment. 	GRP is composed of **strands of glass which are woven to form a flexible fabric. The fabric is normally placed in a mould and polyester resin is added.** **Glass reinforced plastic is lightweight** and has **good thermal insulation properties.** It has a **high strength to weight ratio** 

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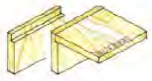
1: Joining Methods

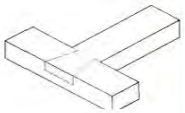
Wood joints can be either permanent of temporary depending on the type and if glue is used.

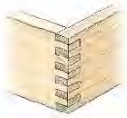
Permanent:	Temporary:
When we do not want to take the pieces apart again	When we will, or might need to take pieces apart again
Glues, welding, rivets	Screws, bolts, nails

1.1Wood joints


Lap Joint

Mortise + Tennon Joint


Dovetail Joint


Finger Joint


Dowel Joint

2. Scales of Production

<u>One off</u>: when you make a unique item
<u>Batch</u>: when you make a few/set amount
<u>Mass</u>: when you make thousands
<u>Continuous</u>: open ended production

3. Adhesives

<u>P.V.A.</u> – Poly Vinyl Acetate – best for joining 2 pieces of wood together
<u>Epoxy</u> – a *thermosetting* resin that can be used to bond most types of material
<u>Contact Adhesive</u> – a glue type that creates a tacky bond on both surfaces to be joined. It can be used with most materials.

4: Materials

4.1 Woods:

Hardwoods:	Softwoods:
Beech Oak Ash	Scots Pine Cedar Spruce

4.2 Engineered Boards

Engineered boards are manmade materials usually made by mixing wood chips and glues to make wooden sheets.

Examples:
Medium Density Fibreboard (MDF)
Chipboard, Plywood and Hardboard

4.3 Plastics

Plastics are made of polymers, and are mostly refined from oil. There are 2 main categories:

Thermoplastics	Thermosetting plastics
Acrylic	Urea Formaldehyde
Polypropylene (PP)	Melamine Formaldehyde
High Impact Polystyrene (HIPS)	Epoxy Resin

4.4 Metals

Metals are hard and usually shiny, containing one or more elements dug and refined from the ground

Ferrous metals are any metal that contains iron and will rust	Non-Ferrous metals do not contain iron and will not rust

Alloys are metals made from a mix of 2 metals – brass is made of copper and zinc.

***Composite** materials* are a mix of 2 different types of material to get the best qualities from each – eg: GRP (Glass Reinforced Plastic)

5: TOOLS


Try square


Bench Hook


Vice


PVA Glue


Router Table


Mallet


Laser Cutter


Chisel


Tenon Saw

6: Surface Finishes

Finishing is usually one of the last stages of making a project. It will usually involve sanding and applying a surface coating to **protect** your material and **improve its visual appearance.**

<u>Some examples:</u>
Paint, Stain, Varnish, Oil, Danish Oil, Wax, Polish & Dip Coating.

7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

CAD	Computer Aided Design
CAM	Computer Aided Manufacture
CNC	Computer Numerical Control

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1. Paper

Type	Description and uses
Layout paper	• lightweight, thin white paper • used for initial ideas • takes colour media well • low cost
Tracing paper	• thin, translucent paper • making copies of drawings • high cost
Cartridge paper	• good quality white paper • available in different weights • general purpose work • can be used to make simple models • medium cost
Bleedproof paper	• smooth, hard paper • used with water-based and spirit-based felt-tip pens • medium cost
Grid paper	• printed square and isometric grids in different sizes • a guide for quick sketches and working drawings • low cost

2. Selection of materials or components

When selecting materials and components considering the factors listed below:

- Functionality: application of use, ease of working
- Aesthetics: surface finish, texture and colour.
- Environmental factors: recyclable or reused materials, product mileage.
- Availability: ease of sourcing and purchase.
- Cost: bulk buying.
- Social factors: social responsibility.
- Cultural factors: sensitive to cultural influences.
- Ethical factors: purchased from ethical sources such as FSC.

What is the FSC? http://www.fsc-uk.org/en-uk/about-fsc/what-is-fsc/fsc-principles

3. Boards

Type	Description and uses
Corrugated card	• strong and lightweight • used for packaging protection and point of sale stands • available in different thicknesses
Duplex board	• large foam-based board • different finishes available including metallic and hologrammatic • used for food packaging, e.g. take-away pizza boxes
Foil lined board	• quality cardboard with a aluminium foil lining • ideal for ready made meals or take away meal cartons • The foil retains the heat and helps keep the food warm
Foam core board	• very light, very stiff and very flat. • It has a white, rigid polystyrene foam centre, with smooth white paper laminated onto both faces. • It is easy to cut with a knife, a mount cutter or on a wall cutter • great for modelling
Ink jet card	• Has been treated so that it will give a high quality finish with inkjet ink • available in matt and gloss
Solid white board	• top quality cardboard made from quality bleached wood pulp. • used for hard backed books and more expensive items • excellent print finish

4. Paper and Boards- Stock sizes and weights

Paper and board is available in sizes from A0 (biggest) to A7 (smallest). The most common size is A4.
Each size is half the one before, eg A4 is half the size of A3.
They are also sold by weight: GSM – grams per square metre.

Card thickness or calliper is traditionally measured in **Microns**. 1000 **Microns** = 1mm, so the higher the value, the thicker the **card** or paper.

5. Properties of paper and boards.

Type	Weight or thickness	Uses	Relative cost (10= high)
Newsprint	50gsm	Newspapers	1
Layout Paper	60gsm	Sketches and tracing	3
Tracing Paper	70 gsm	Tracing	4
Sugar Paper	90gsm	Cheap mounting work	2
Inkjet/Photo paper	150-230gsm	Photos/Presentations	9
Board (Card)	230-750 microns	Model-making	5
Mount Board	230-1000 microns	Model-making, High picture quality mounting	9
Corrugated Card	3000-5000 microns	Packaging protection	5

7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

GSM	Grams per Square Metre
Microns	Thickness of paper or card. 1000microns =1mm thickness

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1. Fabrics

Natural Fabrics

Cotton	Soft, good absorbency, prints well, machine washable, strong breathable	Origins from the Cotton Plant.	Uses: Jeans, towels, Shirts, dresses, underwear
Wool	High UV protection, flameproof, breathable, durable insulating	Origins from Sheep.	Uses: Jumpers, Coat, blankets
Silk	Smooth, Soft, Strong	Origins from the silk worm.	Uses: Wedding dresses, lingerie.
Linen	Strong, cool in hot weather	Origins from the flax plant	Uses: Trousers, tops.
Leather/Suede	Strong, hardwearing, durable.	Origins from the skin of animals, mainly cows.	Uses: Jackets, Trousers, Shoes.

Synthetic fabrics

Polyester	Durable, wrinkle resistant, stain resistant	Uses: Shirts, jackets. Also used in safety belts, conveyor belts and tyre reinforcement.
Polyamide (Nylon)	Durable, high abrasion resistance	Uses: Sportswear, carpets.
Elastane (Lycra)	Stretchy, durable, high stain resistance	Uses: Sportswear, Swimwear, tights.
Viscose	Soft, comfortable, absorbent, easily dyed.	Uses: Dresses, linings, shorts, shirts, coats, jackets and outerwear.
Acrylic	Absorbent, retains shape after washing, easily dyed, resistance to sunlight.	Uses: Jumpers, tracksuits, linings in boots.

1. Fabrics

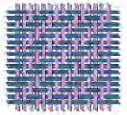
Blended and mixed Fabrics

These fabrics take on the positive characteristics of their combinations

Cotton/Polyester	Easy care and crease resistant	Uses: School shirts.

2. Fabric Construction

Woven

Plain Weave	Extremely strong and hard wearing	
Twill Weave	Extremely high strength and abrasion resistant.	

Knitted

Knitted fabrics	Stretchy, soft and comfortable.	

Non-Woven

Bonded Fabrics	These are webs of fibres held together by glue or stitches.	
Felted Fabrics	Felt is made by combining pressure, moisture and hear to interlock a mat of wool fibres.	

3. Care Labels


Washing Label- will usually have a max. temp number included


Hand Wash only


Do not wring out


Tumble Dry


Iron on low heat. The more dots the higher the heat setting


Do not bleach

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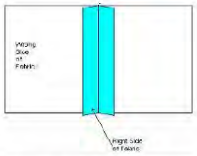
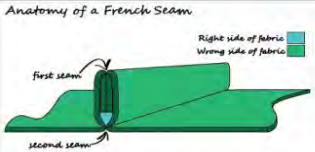
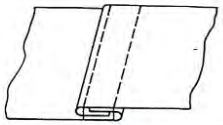
1. Construction Techniques

Open seam	This is used as the main method for constructing textile products. It is normally finished with overlocking to neaten the edges and prevent fraying.	
French Seam	This seam is used on delicate fabrics that can not be overlocked. It is generally used within lingerie.	
Machine and Fell Seam	Very strong double stitched seam for heavy fabrics. Commonly used on jeans.	
Overlocking	Used to neaten seams to prevent fraying. Generally hidden on the inside of a product.	
Binding	Used to finish a curved edge on a product, where over-locking is not suitable.	

2. Decorative Techniques


Applique


Hand Embroidery


Beads & Sequins


Heat Transfer


Buttons


Gathers

Tucks


Tie Dye

Batik


Pin Tucks

3. Equipment

Quick unpick


Pins


Fabric Shears

Sewing Machine

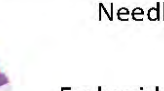

Ironing Board


Tape Measure

Overlocker

Sewing threads


Iron

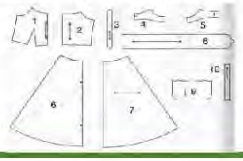

Needle


Embroidery Scissors

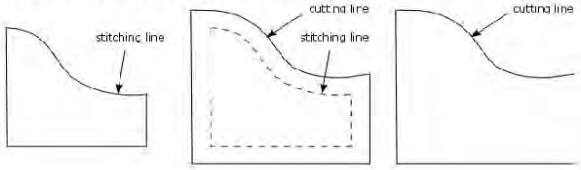
Pinking Shears

4. Key Terminology

Pattern
This is the term given to a paper template to aid in the cutting out of fabric for accurate construction.



Seam Allowance
This is usually a 1cm 'boarder' around your pattern to allow for construction to be the correct size.



Right Side
This is the 'correct' side of the fabric that you wish to see.

Wrong Side
This is the side of the fabric that you do not wish to see.

Pressing
This is the term given when ironing your product; e.g. press your seams open, would refer to when an open seam is sewn and they need to pressed outwards to give a flat finish.

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1. CAD – Computer Aided Design

Advantages of CAD	Disadvantages of CAD
Designs can be created, saved and edited easily, saving time	CAD software is complex to learn
Designs or parts of designs can be easily copied or repeated	Software can be very expensive
Designs can be worked on by remote teams simultaneously	Compatibility issues with software
Designs can be rendered to look photo-realistic to gather public opinion in a range of finishes	Security issues - Risk of data being corrupted or hacked
CAD is very accurate	CAD Software
CAD software can process complex stress testing	

2. CAM – Computer Aided Manufacturing

Advantages of CAM	Disadvantages of CAM
Quick – Speed of production can be increased.	Training is required to operate CAM.
Consistency – All parts manufactures are all the same.	High initial outlay for machines.
Accuracy – Accuracy can be greatly improved using CAM.	Production stoppage – If the machines break down, the production would stop.
Less Mistakes – There is no human error unless pre programmed.	Social issues . Areas can decline as human jobs are taken.
Cost Savings – Workforce can be reduced.	


Laser Cutter


Robots


Barcode Scanner


AGV – Automated Guided Vehicle

3: Production Techniques

3.1 Flexible Manufacturing Systems (FMS) : involves an assembly of automated machines commonly used on short-run batch production lines where the products frequently change.

3.2 Lean Manufacturing: It aims to manufacture products just before they are required to eliminate areas of waste including:

- Overproduction
- Waiting
- Transportation
- Inappropriate processing
- Excessive inventory
- Unnecessary motion
- Defects

3.3 Just In Time (JIT) : Items are created as they are demanded. No surplus stock of raw material, component or finished parts are kept.

Advantages of JIT	Disadvantages of JIT
No warehousing costs	Reliant on a high quality supply chain
Ordered secured before outlay on parts is required	Stock is not available immediately off-the-shelf
Stock does not become obsolete, damaged or deteriorated	Fewer benefits from bulk purchasing

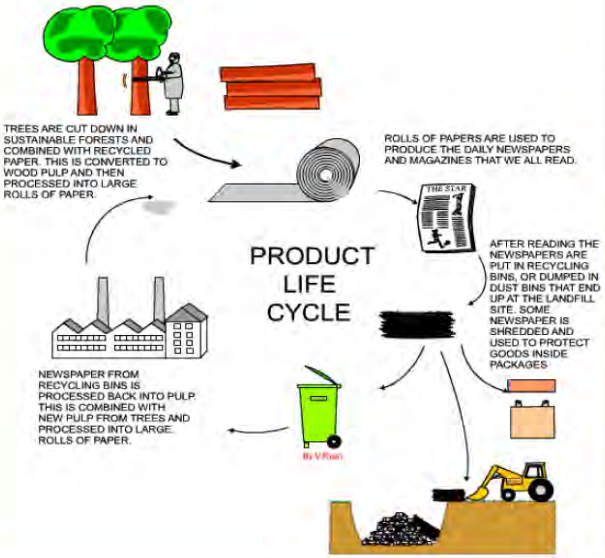
4. Scales of Production

One off: when you make a unique item
Batch: when you make a few/set amount
Mass: when you make thousands
Continuous: open ended production

5: Informing Design Decisions

5.1 Planned obsolescence - Planned obsolescence is when a product is deliberately designed to have a specific life span. This is usually a shortened life span.
5.2 Design for maintenance - Products are often designed to be thrown away when they fail... This can be achieved by designing products that can be repaired and maintained.
5.3 Disposability – Some products are designed to be disposable.

5.4 Product Lifecycle -



7: KEY WORD FOCUS

You should be able to explain the meaning of each of these words by the end of this rotation.

CNC	Computer Numerical Control
EPOS	Electronic Point Of Sale (Barcodes)

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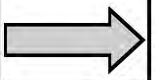
1: Mechanical Devices - Motion

There are four types of motion:

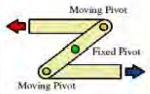
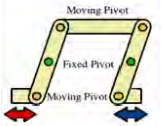
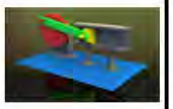
Linear Motion is movement in one direction along a straight line.		
Oscillating Motion This motion is similar to reciprocating motion, but the constant movement is from side to side along a curved path.		
Rotary Motion Examples of circular motion include a ball tied to a rope and being swung round in a circle		
Reciprocating Motion, this is repetitive up-and-down or back-and-forth linear motion		

2: Mechanical Devices – Levers

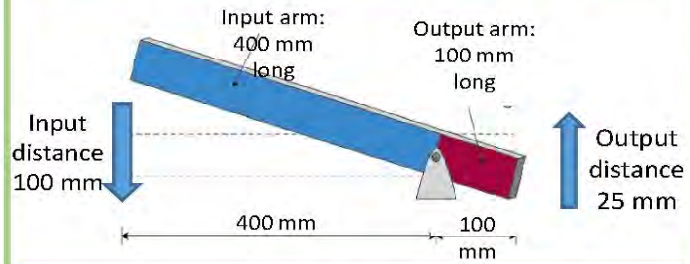
There are three classes of levers.

Class One A class one lever has its input on one side of the fulcrum and its output on the other.		
Class Two A class two lever has its input at one end of the lever, its output in the middle and fulcrum at the other end.		
Class Three A class three lever has its output at one end of the lever, its fulcrum at the other with its input in the middle.		

3: Mechanical Devices – Linkages

Reverse motion linkage	The reverse motion linkage changes the direction of the input motion so that the output travels in the opposite direction. If the input is pulled the output pushes and vice versa. It uses a central bar held in position with a fixed pivot (fulcrum) that forces the change in direction and two moving pivots which are connected to the input and output bars.	
Parallel motion or push/ pull linkage	The push/pull linkage maintains the direction of the input motion so that the output travels in the same direction. If the input is pulled the output is pulled and so on. It uses three linking bars, four moving pivots and two fixed pivots.	
Bell crank linkage	The bell crank linkage changes the direction of the input motion through 90 degrees. It can be used to change horizontal motion into vertical motion or vice versa. It uses a fixed pivot and two moving pivots.	
Crank and slider	The crank and slider linkage changes rotary motion into reciprocating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots to push and pull a slider along a set path.	
Treadle linkage	The treadle linkage changes rotary motion into oscillating motion or vice versa. It uses a crank which is held with a fixed pivot. A connecting rod uses two moving pivots and a further fixed pivot to create a windscreen wiper motion.	

4: How to work out a levers distance of travel



Output ÷ Input x Input distance = Output distance

100 ÷ 400 x 100 = 25 mm

5: How to work out the Mechanical Advantage

Or use the following formula:

MA = Load = 300N = 3
Effort 100N 1

This is written as 3:1 or just MA of 3

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1: Forces and Stresses

Force	Description	A fair test for each force/stress.	How a material / object can be adapted to resist	Examples
Tension	Forces pulling in opposite directions.	Apply the same weight to each material and suspended in the same manner.	Concrete can have steel bars inserted to reinforce.	
Compression	Forces that are trying to crush or shorten.	Insert materials into a vice/clamp and apply the same amount of twists to the handle.	Composite panels can have a honeycomb structure sandwiched in the middle to resist.	
Bending	Flexing force	Apply the same weight to the material.	Steel beams have an I profile to resist bending.	
Torsion	Twisting force.	Use clamps & stands to hold the materials and turn in opposite directions at the same angle.	The diagonals on a tower crane help the structure against torsion.	
Shear	A strain produced when an object is subjected to opposing forces.	Place the material between a tool that works in opposite directions. e.g. Shears	Bolts are hardened and have unthreaded shanks to help stop shearing.	

2. Improving functionality of materials

Process	Description	Result	Example	Visual Example
Lamination	Layering of thin materials	Depending on the direction of lamination it can make boards stiffer or actually more flexible	Plywood: Laminations at 90 degrees to each other - Rigid Flexi-ply: laminations all the same direction - Bendy	
Bending / Folding	Folding a 90 degree edge on sheet metal / plastic	Makes the panel more rigid	Body panels on cars	
Webbing	Modern polymer fabrics woven together	Extremely strong and durable fabric	Seat belts	
Fabric interfacing	A strengthening material added to the unseen face of a fabric	Adds strength / shape	Shirt collars	

1: The Modification of properties for specific purposes

Process	Material	Purpose
Seasoning	Timber	Removes the moisture content so that the timber will not shrink, warp and twist
Annealing (heating)	Copper	Softens the copper to make it more malleable
Addition of Stabilisers	PVC	Stops plastic become brittle with exposure to the sun

Timber being seasoned in a kiln

Copper bowl being annealed

Metal compounds (stabilisers) are added to PVC for UV protection

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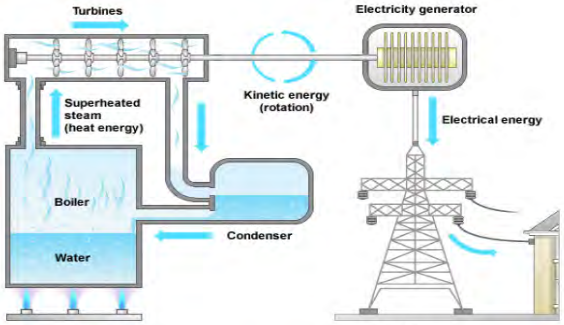
Energy Types
1. Fossil Fuels – Non-renewable energy

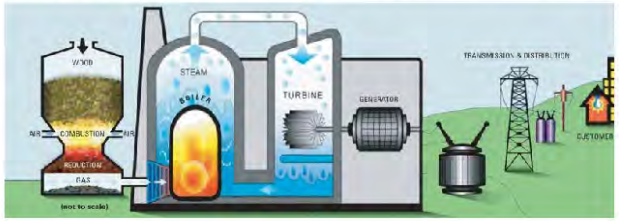


In a thermal power station fuel such as coal, oil or gas is burned in a furnace to produce heat - chemical to heat energy.

- this heat is used to change water into steam in the boiler.
- the steam drives the turbine - heat to kinetic energy
- this drives the generator to produce electricity - kinetic to electrical energy.

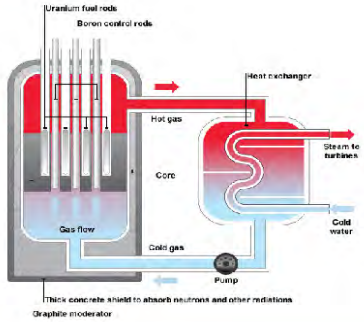
Some experts believe that fossil fuels will run out in our lifetime.

Energy Types 2. Biomass Energy –Renewable Energy



Biomass is an industry term for getting energy by burning wood, and other organic matter. Burning biomass releases carbon emissions, but has been classed as a renewable energy source in the EU and UN legal frameworks, because plant stocks can be replaced with new growth.

Energy Types
3. Nuclear Energy – Renewable energy



The main nuclear fuels are **uranium** and **plutonium**. In a nuclear power station nuclear fuel undergoes a controlled chain reaction in the reactor to produce heat - nuclear to heat energy.

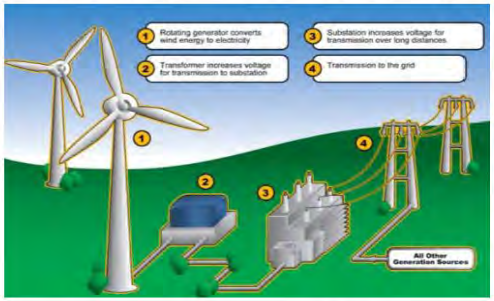
- heat is used to change water into steam in the boiler.
- the steam drives the turbine (heat to kinetic energy)
- this drives the generator to produce electricity - kinetic to electrical energy.

Energy Types
8.Batteries

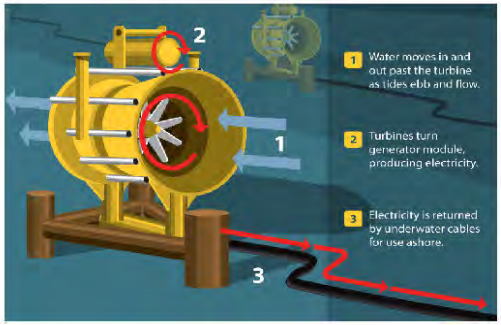
Alkaline batteries are the most common type of domestic batteries, they are disposable but contain chemicals that are bad for the environment. Fortunately more and more battery recycling banks are appearing now where most of the battery can be reused.

Rechargeable batteries are better for the environment and more economical in the long run (High initial purchase price). Their lifespan decreases with every charge.

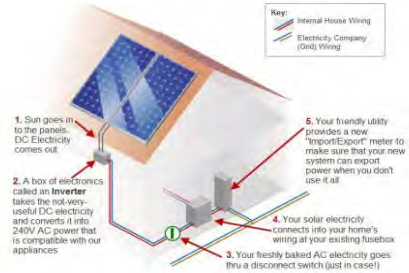
Energy Types
4. Wind Energy – Renewable Energy



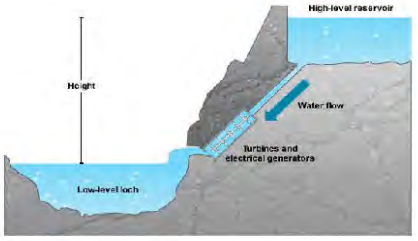
6. Tidal Energy – Renewable Energy



5. Solar Energy – Renewable Energy



7. Hydroelectricity – Renewable Energy

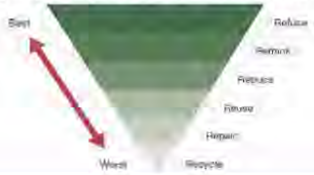


- In a hydroelectric power station water is stored behind a dam in a reservoir. This water has gravitational potential energy.
- The water runs down pipes (potential to kinetic energy) to turn the turbine
- The turbine is connected to a generator to produce electricity (kinetic to electrical energy).

Knowledge Organiser AQA Design & Technology 8552

The 6 R's

The 6 Rs are an important checklist. They are used by designers to reduce the environmental impact of products. They can also be used to evaluate the environmental impact of other products.
The **hierarchy of sustainability** places the strategies that are best for the planet about those that have a greater negative impact on the environment.



1. Refuse

The first stage in the process is to ask whether the proposed product, part, purchase or even journey is required at all. Asking the question 'Is it really necessary?' can play a major role in reducing the demand on materials. Simply not using something saves 100% of what you have chosen not to use.
Example include:

- Using your own carrier bag rather than purchasing a new one.
- Walking or cycling to school instead of being driven.
- Not using products such as some pesticides that are known to be harmful to the environment.
- Not eating (or using) products that are over-farmed, over-fished or on the endangered list.

2. Rethink

Consumers have a growing number of choices to make about where and on what they spend their income. Greener and more sustainable options are not always the cheapest or the best, but making informed decision and rethinking ones spending power can play a huge part in conserving resources.
Deciding on the design of a product, e.g. the materials being used in its production, will directly affect its sustainability.
The types of questions designers need to ask are:

- Are the materials locally sourced?
- Are they sustainably produced?
- Is it essential to use this material, of which there is a finite supply?

By rethinking how the product is likely to be made, the product can often be redesigned in a more responsible way.

3. Reduce

Reduction is often the result of having re-thought a design or action. Materials and energy are saved due to efficient manufacturing practices and the use of clever design, incorporating sustainable materials.

- Modern materials that are lighter and stronger than traditional ones have contributed to the miniaturisation of products, saving material and energy in manufacture and use.
- Reducing the complexity or number of parts a product uses and reducing the number of different materials in a product makes recycling easier.
- In factories, schools and hotels, fitting motion sensitive lighting and smart heating systems can significantly reduce energy usage.
- Many large companies employ staff to conduct 'energy walks' to turn off unused appliances and lights and to ensure windows and doors are shut to conserve heat.

4. Reuse

Reusing products multiple times for the same purpose is also known as **primary recycling.** Reusing a product in a different way from the one it was designed for is known as **secondary recycling.**
The classic glass milk bottle is reused many times before it reaches the end of its useful life, as which point it is recycled. A plastic milk bottle, however, is intended to be used only one, although it can have many different subsequent uses.
Donating to and buying from charity shops extends the life of products and in recent years there has been a resurgence of in products having second lives, thanks to websites such as eBay, Freecycle or Gum tree.

It is also becoming popular for furniture and other household items to be **upcycled** with a coat of paint and some minor repairs or adaptations, extending their useful life by many years.

5. Repair

Being able to repair a product when it is broken or worn is a way of extending its life and delaying the purchase of a new one. Repairing is a positive option over replacement as it means that only some parts of the product are replaced. This creates jobs for skilled people who conduct repairs and stimulates a spare parts market.
Unfortunately, repairing products has become harder over years. Growing number of products are not design to be repaired. There are a number of reasons why items may be designed this way, but it is usually because they are cheaper to replace than repair. Some products, especially modern electronic products, are designed to last only a few years as technology dates quickly and older products will be superseded by newer, faster, more efficient models. This is called **planned obsolescence.**

6. Recycle

Tertiary recycling, although a very important stage, is lower down the hierarchy of preferred options because most materials that are recycled this way tend to be of lower quality than the original material. It takes a lot of energy to recycle materials.
This form of recycling requires the reprocessing of the material and in many cases involves chemicals and/or heat to recover the recycled materials. In an ideal world, tertiary recycling would remove all recyclable materials from our household waste so that only biodegradable materials would be left. Only very few parts of the world are set up to cope with this level of processing.

7. Sustainability

Our planet has to provide all of our basic human needs, such as food, shelter and warmth.
Designers now have a much better understanding of which materials are sustainable and which are not. The general principle is that resources fall into two categories:
Finite resources – are ones which are in limited supply or cannot be reproduced.
Non-finite resources – are ones which are in abundant supply and are unlikely to be exhausted.

8. Recyclable materials

Once all useful and recyclable materials are removed, the majority of the remaining waste is organic matter and can be processed in one of two ways; **'Recover'** or **'Rot'**. Food waste and garden waste can be processed at a high temperature and turned into compost. The waste can also be buried in **landfill** sites where the resulting methane gas from the rotting matter is collected and burned and used to generate heat or electricity in the same way.

Knowledge Organiser AQA Design & Technology 8552

Designer Name	Facts	Logo	Examples
Coco Chanel	**Gabrielle Bonheur "Coco" Chanel** (19 August 1883 – 10 January 1971) was a French fashion designer and businesswoman. She was the founder and namesake of the Chanel brand.	CHANEL	
Alexander McQueen	**Lee Alexander McQueen**, CBE (17 March 1969 – 11 February 2010), known professionally as **Alexander McQueen**, was a British fashion designer and couturier. He is known for having worked as chief designer at Givenchy from 1996 to 2001 and for founding his own Alexander McQueen label.		
Vivienne Westwood	**Dame Vivienne Isabel Westwood** DBE RDI (born 8 April 1941) is a British fashion designer and businesswoman, largely responsible for bringing modern punk and new wave fashions into the mainstream.	Vivienne Westwood	
Harry Beck	**Henry Charles Beck** (4 June 1902 – 18 September 1974), known as **Harry Beck**, was an English technical draughtsman best known for creating the present London Underground Tube map in 1931.	HARRY BECK 1902–1974 Designer of the London Underground map was born here	
Norman Foster	**Norman Robert Foster, Baron Foster of Thames Bank**, OM, HonFREng (born 1 June 1935) is a British architect whose company, Foster + Partners, maintains an international design practice famous for high-tech architecture.	NORMAN FOSTER	

Designer Name	Facts	Logo	Examples
Marcel Breuer	**Marcel Lajos Breuer** (22 May 1902 – 1 July 1981) was a Hungarian-born modernist, architect, and furniture designer. Breuer extended the sculptural vocabulary he had developed in the carpentry shop at the Bauhaus into a personal architecture	Marcel Breuer	
Sir Alec Issigonis	**Sir Alexander Arnold Constantine Issigonis**; 18 November 1906 – 2 October 1988) was a British-Greek designer of cars, widely noted for the ground-breaking and influential development of the Mini, launched by the British Motor Corporation (BMC) in 1959.		
William Morris	**William Morris** (24 March 1834 – 3 October 1896) was an English textile designer, poet, novelist, translator, and socialist activist. Associated with the British Arts and Crafts Movement, he was a major contributor to the revival of traditional British textile arts and methods of production.	THE ORIGINAL MORRIS & Co	
Mary Quant	**Dame Barbara Mary Quant, Mrs Plunket Greene**, (born 11 February 1934) is a Welsh fashion designer and British fashion icon She became an instrumental figure in the 1960s London-based Mod and youth fashion movements.	MARY QUANT	
Louis Comfort Tiffany	**Louis Comfort Tiffany** (February 18, 1848 – January 17, 1933) was an American artist and designer who worked in the decorative arts. He is best known for his work in stained glass.	LOUIS COMFORT TIFFANY	
Philippe Starck	**Philippe Starck** (born January 18,. 1949) is a French designer known since the start of his career in the 1980s for his interior, product, industrial and architectural design including furniture	S+ARCK	

Knowledge Organiser AQA Design & Technology 8552

Designer Name	Facts	Logo	Examples
Raymond Templier	**RAYMOND TEMPLIER** (1891 - 1968) like many of his contemporaries in jewelry, was born to a family with a long tradition as jewelers.		
Gerrit Rietveld	**Gerrit Thomas Rietveld**; 24 June 1888 – 25 June 1964) was a Dutch furniture designer and architect. One of the principal members of the Dutch artistic movement called De Stijl, Rietveld is famous for his Red and Blue Chair.	Gerrit Rietveld	
Charles Rennie Macintosh	**Charles Rennie Mackintosh** (7 June 1868 – 10 December 1928) was a Scottish architect, designer, water colourist and artist. His artistic approach had much in common with European Symbolism. His work was influential on European design movements such as Art Nouveau and Secessionism.	CHARLES RENNIE MACKINTOSH	
Aldo Rossi	**Aldo Rossi** (3 May 1931 – 4 September 1997) was an Italian architect and designer who achieved international recognition in four distinct areas: theory, drawing, architecture and product design. He was the first Italian to receive the Pritzker Prize for architecture.	ALDO ROSSI	
Ettore Sottsass	**Ettore Sottsass** (14 September 1917 – 31 December 2007) was an Italian architect and designer during the 20th century. His work included furniture, jewellery, glass, lighting, home objects and office machine design, as well as many buildings and interiors.	SOTTSASS	

Company Name	Facts	Logo	Examples
Alessi	**Alessi** is a housewares and kitchen utensil company in Italy, producing everyday items from plastic and metal, created by famous designers.	ALESSI	
Apple	**Apple Inc.** is an American multinational technology company headquartered in Cupertino, California that designs, develops, and sells consumer electronics, computer software, and online services.		
Braun	**Braun GmbH** formerly **Braun AG**, is a German consumer products company based in Kronberg. From 1984 until 2007, Braun was a wholly owned subsidiary of The Gillette Company, which had purchased a controlling interest in the company in 1967.	BRAUN	
Dyson	**Dyson Ltd.** is a British technology company established by James Dyson in 1987. It designs and manufactures household appliances such as vacuum cleaners, hand dryers, bladeless fans, heaters and hair dryers.	dyson	
GAP	**The Gap, Inc.** commonly known as **Gap Inc.** or **Gap**, (stylized as **GAP**) is an American worldwide clothing and accessories retailer.	GAP	
Primark	**Primark** known as **Penneys** in the Republic of Ireland) is an Irish clothing and accessories company which is a subsidiary of AB Foods, and is headquartered in Dublin.	PRIMARK	
Under Armour	**Under Armour, Inc.** is an American company that manufactures footwear, sports and casual apparel.		
Zara	**Zara** is a Spanish clothing and accessories retailer based in Arteixo, Galicia. It is the main brand of the Inditex group, the world's largest apparel retailer.	ZARA	

Year 10 Knowledge Organisers

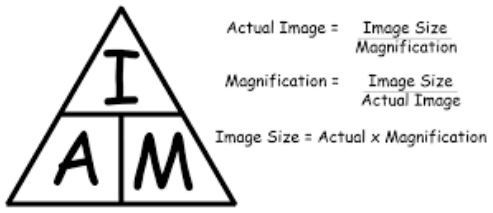
Science

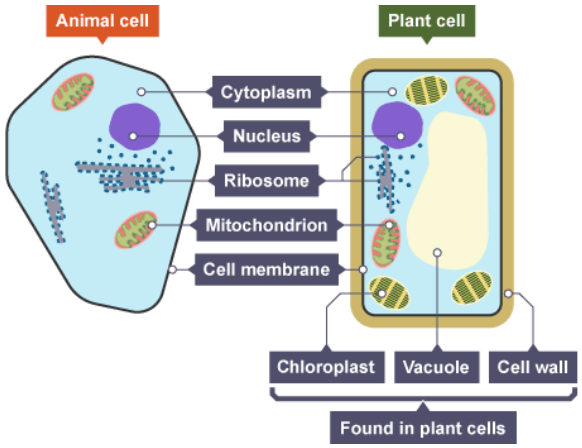
Knowledge Organiser – Cell Structure

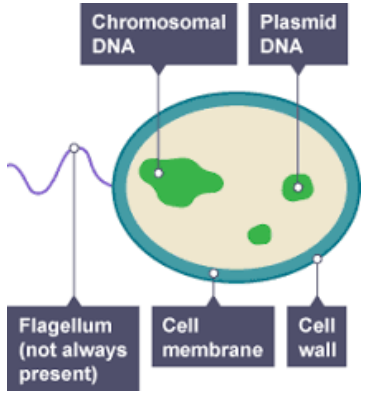
Key Terms

Eukaryotic cells	Cells that contain a nucleus
Eukaryote	An organism that is made of eukaryotic cells
Prokaryotic cells	Single-celled organisms that do not contain a nucleus
DNA	Deoxyribonucleic acid – the genetic information found in all living organisms
Ribosome	A cell organelle that makes proteins
Respiration	The release of energy from glucose
Diffusion	The net movement of particles form an area of high concentration to an area of lower concentration
Organelle	A part of a cell with a specific function
Mitochondrion	A cell organelle in which respiration occurs
Chloroplast	A cell organelle in which photosynthesis occurs
Cytoplasm	Jelly like substance in cells where chemical reactions occur
Nucleus	A cell organelle found in eukaryotes containing their genetic material
Cell membrane	Structure surrounding the cell that controls what moves in and out of the cell
Vacuole	Found in plant cells, filled with cell sap, keeps the cell turgid
Cell wall	Made from cellulose and provides structural strength the some cells (not animal cells)
Photosynthesis	Chemical reaction that happens in chloroplasts that stores energy in glucose
Turgid	Describes a swollen cell
Biconcave	Describes a shape with a dip that curves inwards on both sides
Ova	Eggs
Axon	The extension of a nerve cell along which the electrical impulses travel
Phloem	Tubes of living cells that carry sugars to all cells in plants
Xylem	Tubes of dead plant cells through which water flows
Electron microscope	A microscope that uses electrons in place of light to give higher magnification
Resolution	The smallest distance between two separate points

Diagrams

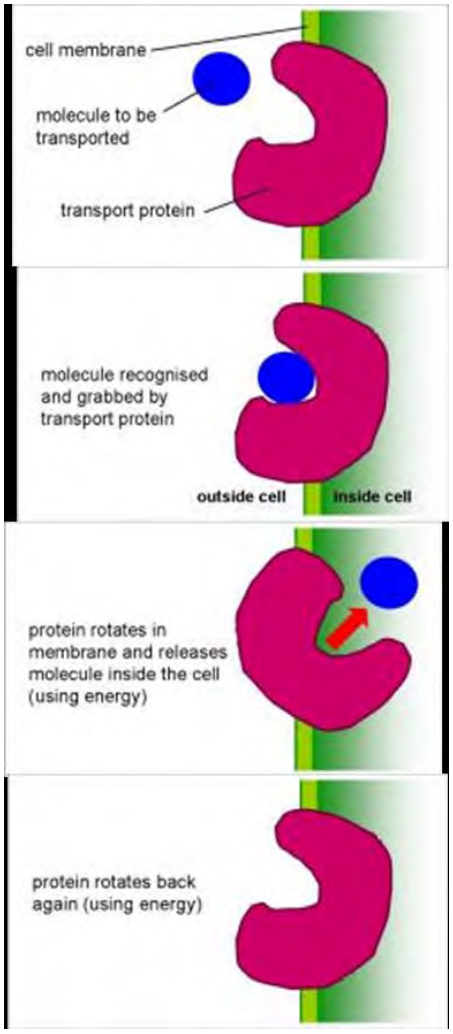




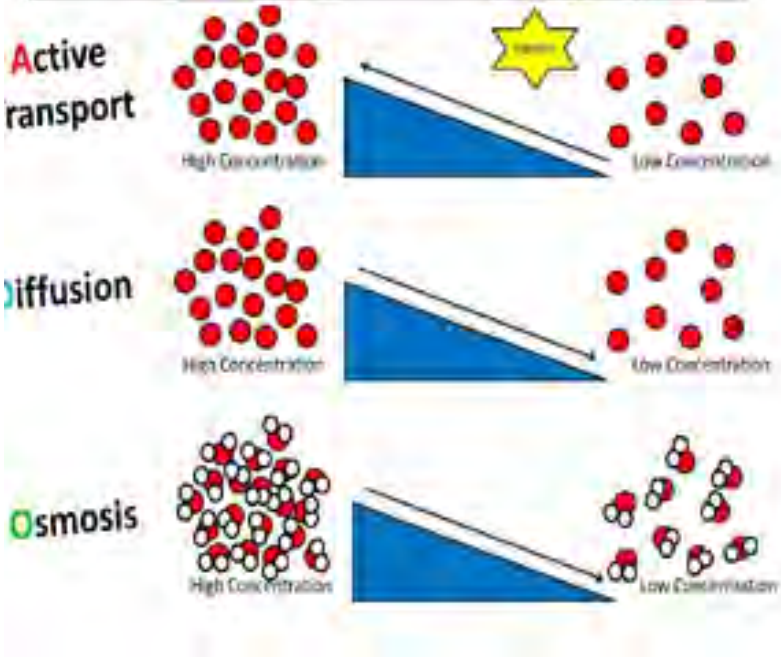


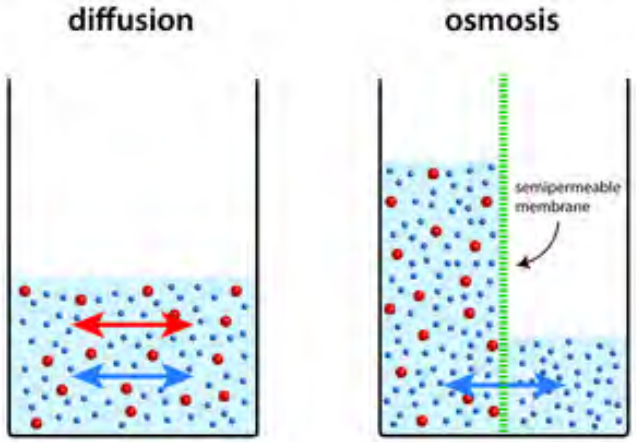
Knowledge Organiser – Cell Transpor

Active Transport



Process	Movement of	Condition	Additional requirements
Diffusion	Molecules/ ions	High conc. to low conc.	Down a conc. gradient
Osmosis	Water molecules	High water potential to low water potential	Across a partially permeable membrane
Active transport	Particles of substances	Low conc. to high conc.	Against a conc. Gradient: Energy required





Temperature	• Higher temperature → Diffuse Faster
Surface Area	• Larger surface → Diffuse Faster
Concentration Gradient	• Higher Gradient → Diffuse faster
Size of Particles	• Smaller particles → Diffuse faster

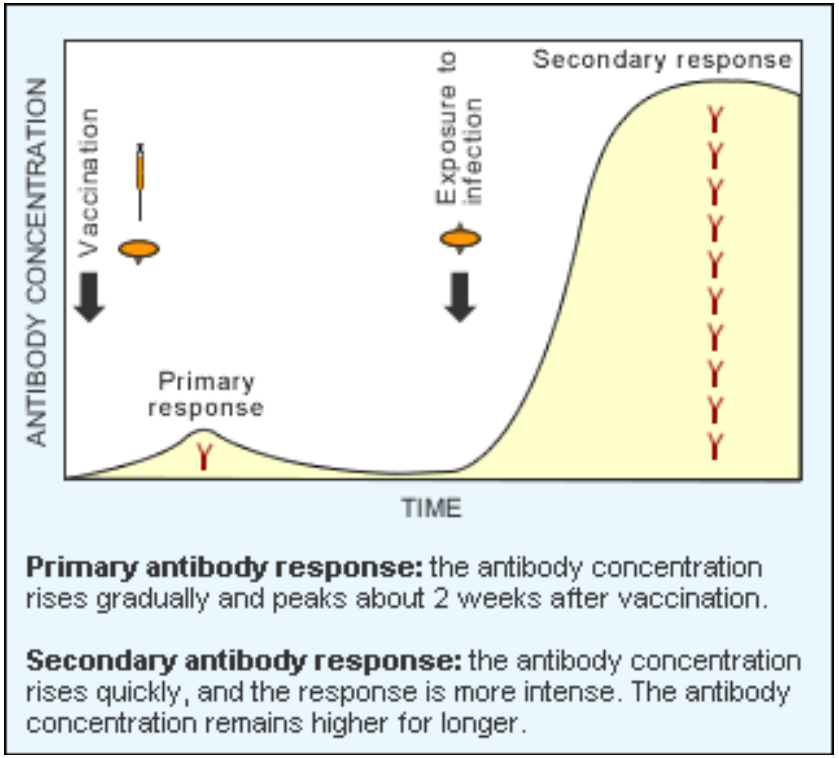
Knowledge Organiser – Infection and Response

Key Terms

Infectious	Describes a pathogen that can easily be transmitted, or an infected person who can pass on the disease.
Vector	An animal that spreads a communicable disease.
Antibiotic	A group of medicines, first discovered by Alexander Fleming, that kill bacteria and fungi but not viruses.
Chitin	A polymer made from sugars that forms the cell walls of fungi and the exoskeleton of insects.
Hyphae	Branching filaments of a fungus that spread out.
Malaria	A communicable disease, caused by a protest transmitted in mosquitos, which attacks red blood cells.
Insecticide	A chemical that kills insects.
Lysozymes	Antibacterial enzymes found in your tears to prevent eye infections.
Cilia	Tiny hair-like projections from ciliated cells that waft mucus out of the gas exchange system.
Antigen	A protein on the surface of a pathogen that your antibodies can recognize as foreign.
Antitoxin	A protein produced by your body to neutralize harmful toxins produced by pathogens.
Vaccine	A medicine containing an antigen from a pathogen that triggers a low level immune response so that if you become infected later your body can respond more quickly to the pathogen.
Antiseptic	A substance applied to the skin or another surface to destroy pathogens.
Anaesthetic	A drug that stops all pain sensation and can be local or general.
Efficacy	How effective a drug is.

Double blind trials	A medical experiment in which the patient and doctors do not know who has been given the drug and who has been given the placebo.
Placebo	A medicine that has only psychological effects.
Phagocytes	A type of white blood cell that engulf pathogens.
Lymphocytes	A type of white blood cell that produce antibodies.
Antibodies	Highly specific Y-shaped proteins that are produced by the immune system to help stop intruders from harming the body.

Diagrams



Primary antibody response: the antibody concentration rises gradually and peaks about 2 weeks after vaccination.

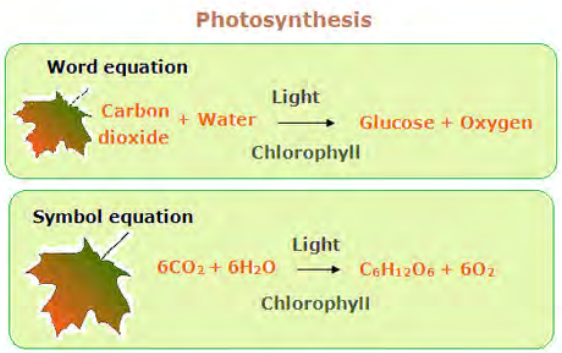
Secondary antibody response: the antibody concentration rises quickly, and the response is more intense. The antibody concentration remains higher for longer.

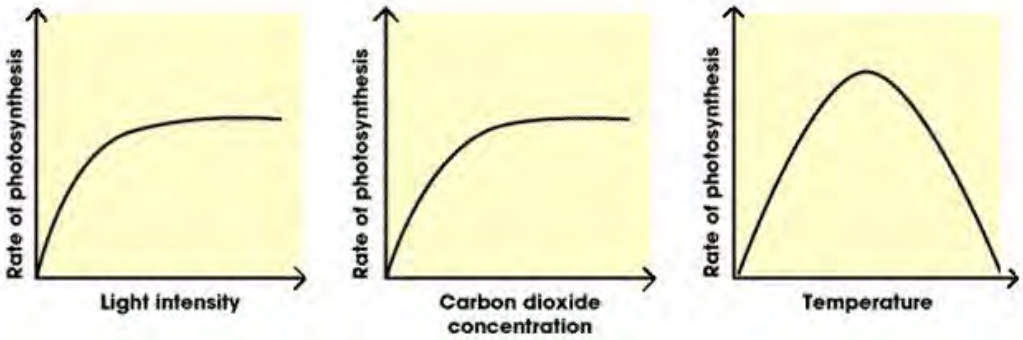
Knowledge Organiser – Bioenergetics

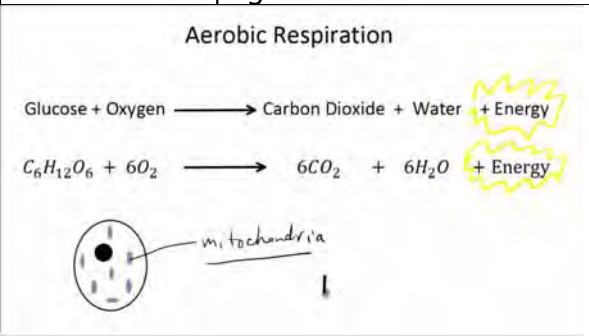
Key Terms

Endothermic reaction	A reaction that requires energy to be absorbed to work
Photosynthesis	The process by which plants use sunlight to produce glucose. Happens in chloroplasts
Limiting factor	Anything that reduces or stops the rate of a reaction
Yield	The amount of an agricultural product produced
Respiration	The process by which living things release energy from glucose. Happens in mitochondria
Aerobic	In the presence of oxygen
Oxidation	A reaction that uses oxygen
Exothermic reaction	A reaction that gives out thermal energy
Anaerobic	In the absence of oxygen
Oxygen debt	The amount of extra oxygen the body needs after exercise to break down lactic acid
Fermentation	The chemical breakdown of glucose into ethanol and carbon dioxide by respiring micro-organisms such as yeast
Metabolism	The sum of all the chemical reactions that happen in an organism

Diagrams







Anaerobic Respiration

In animals

Glucose → Lactic Acid + energy

In plants & fungi

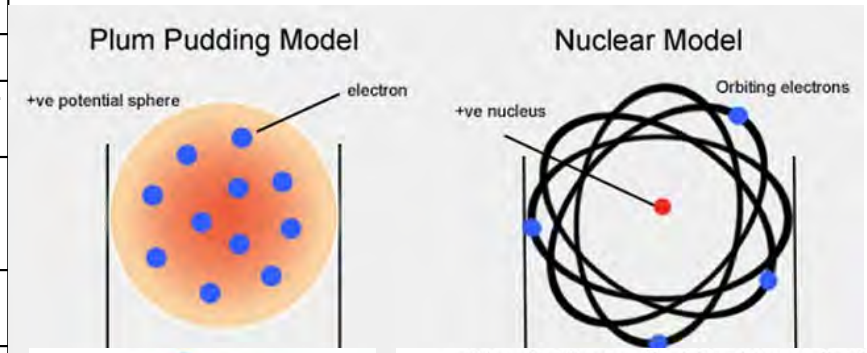
Glucose → Ethanol + Carbon Dioxide + energy

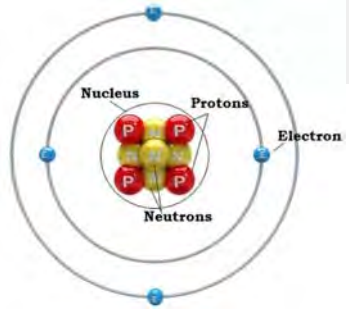
Knowledge Organiser – Atomic Structure and the Periodic Table

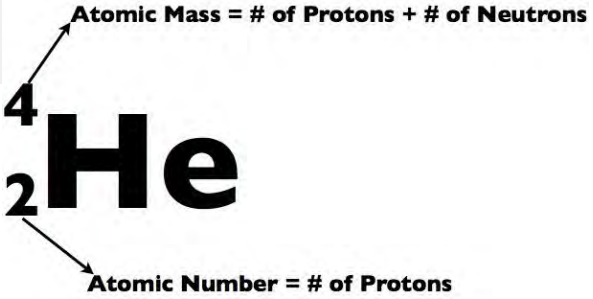
Key Terms

Atom	A particle with no electric charge made up of a nucleus containing protons and neutrons and surrounded by electrons.
Proton	A positively charged particle found in the nucleus of an atom.
Neutron	A neutral particle found in the nucleus of an atom.
Electron	Negatively charged particles found on energy levels (shells) surrounding the nucleus inside atoms.
Nucleus	Central part of an atom containing protons and neutrons.
Energy level (shell)	The region an electron occupies surrounding the nucleus inside an atom.
Atomic number	Number of protons in an atom.
Mass number	Number of protons plus neutrons in an atom.
Isotope	Atoms with the same number of protons but a different number of neutrons.
Relative atomic mass	The average mass of atoms of an element taking into account the mass and amount of each isotope it contains. RAM = Total mass of atoms / total number of atoms
Electronic structure	The arrangement of electrons in the energy levels of an atom.
Ion	An electrically charged particle containing different numbers of protons and electrons.
Group	The name given to each column in the periodic table.
Element	A substance containing only one type of atom.
Compound	A substance made from different elements chemically bonded together.
Period	The name given to a row in the periodic table.
Alkali metals	The elements in Group 1 of the periodic table.
Noble gases	The elements in Group 0 of the periodic table.
Halogens	The elements in Group 7 of the periodic table.
Diatomic molecule	A molecule containing 2 atoms.
Halides	Compounds made from Group 7 elements.
Mixture	More than one substance that are not chemically bonded.
Solvent	The liquid that a solute dissolves in.
Solution	A solute dissolved in a solvent.
Soluble	A substance that will dissolve.
Insoluble	A substance that will not dissolve.
Solute	The solid that dissolves in a solvent.

Diagrams







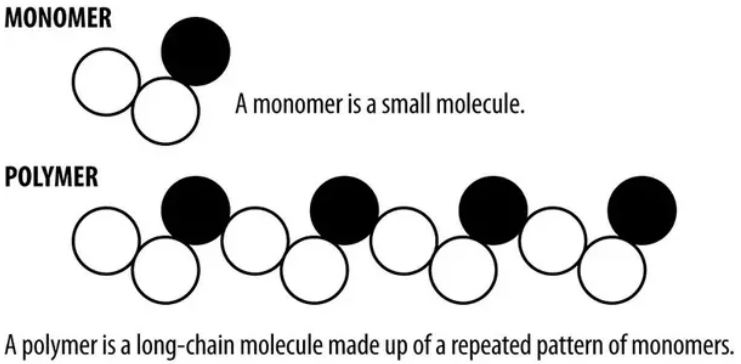
Knowledge Organiser – Bonding, structures and the properties of matter

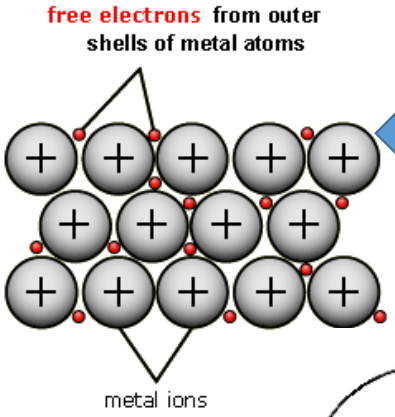
Key Terms

Giant Lattice	Ionic substances are made up of a giant lattice of positive and negative ions in a regular structure.
Ionic bonding	The electrostatic attraction between positive and negative ions
Molecule	Particle made from atoms joined together by covalent bonds
Covalent bond	Two shared electrons joining atoms together
Intermolecular forces	Weak forces between molecules
Polymer	Long chain molecule made from joining lots of small molecules together by covalent bonds
Monomer	The building block (molecule) of a polymer
Delocalised	Free to move around
Metallic bonding	The attraction between the nucleus of metal atoms and delocalized electrons
Malleable	Can be hammered into shape
Alloy	A mixture of a metal with small amounts of other elements, usually other metals
States of matter	These are solid, liquid and gas
Fullerenes	Family of carbon molecules each with carbon atoms linked in rings to form a hollow sphere or tube
Catalyst	Substance that speeds up a chemical reaction but is not used up in it

Diagrams

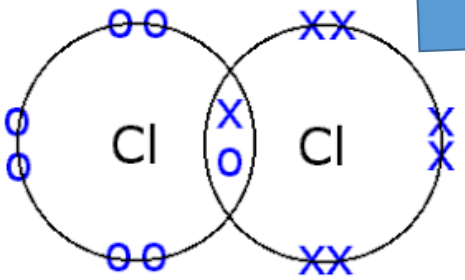
Structure of Monomers and Polymers

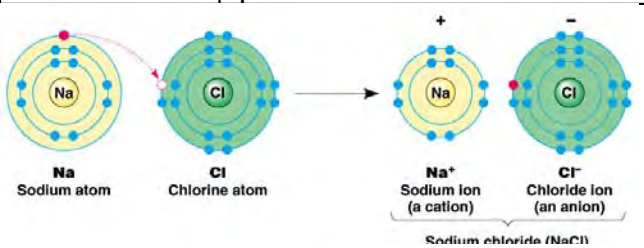


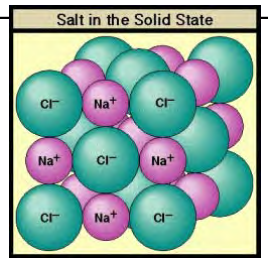


Metallic structure

Covalent bonding





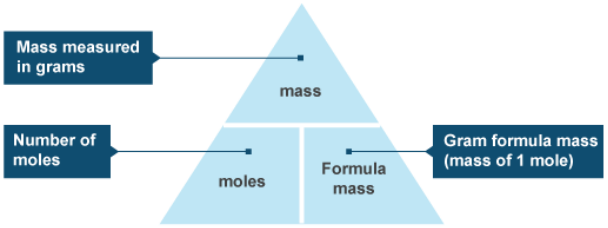


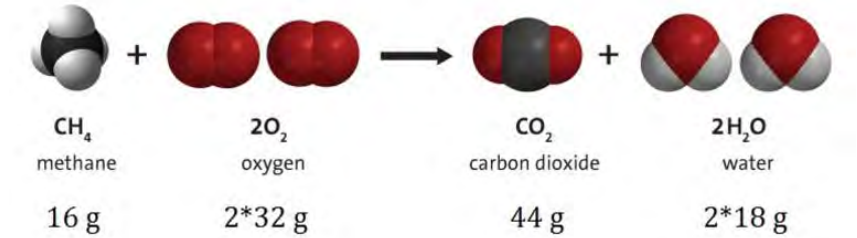
Ionic bonding and structure

Knowledge Organiser – Quantitative Chemistry

Key Terms

Relative atomic mass	The average mass of atoms of an element, taking into account the mass and the amount of each isotope it contains.
Relative formula mass	The sum of the relative atomic masses of all the atoms in the formula.
Mole	Measurement of the amount of a substance.
Avogadro constant	The number of atoms, molecules or ions in one mole of a given substance (6.02×10^{23}).
Thermal decomposition	Reaction where high temperature causes a substance to break down into simpler substances.
Excess	When the amount of a reactant is greater than the mount that can react.
Limiting reactant	The reactant in a reaction that determines the amount of products formed. Any other reagents are all in excess and will not react.

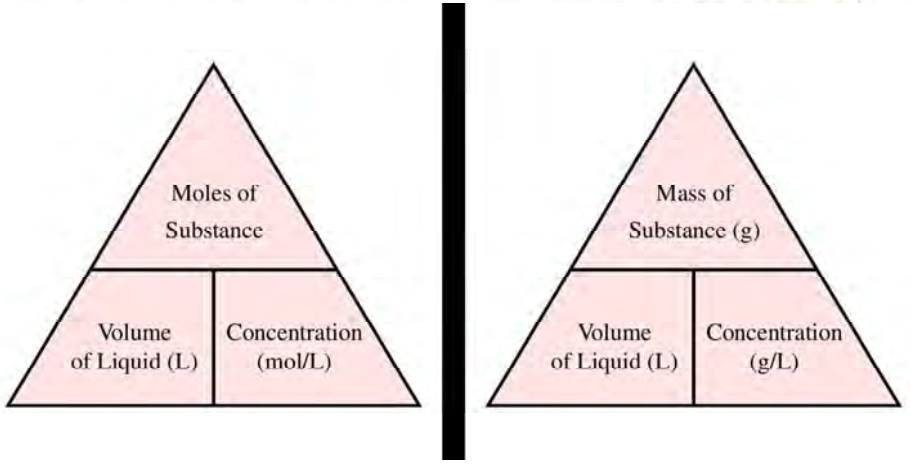




Diagrams

carbon	+	oxygen	→	carbon dioxide
C	+	O_2	→	CO_2
12	+	2 x 16	→	12+(2 x 16)
12g		32g		44g

So we need 32g of oxygen to react with 12g of carbon and 44g of carbon dioxide is formed in the reaction.

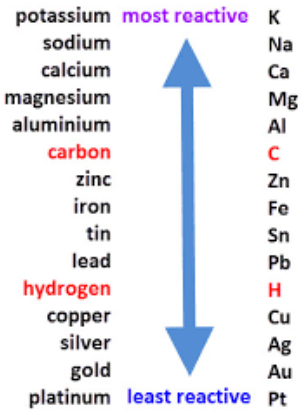


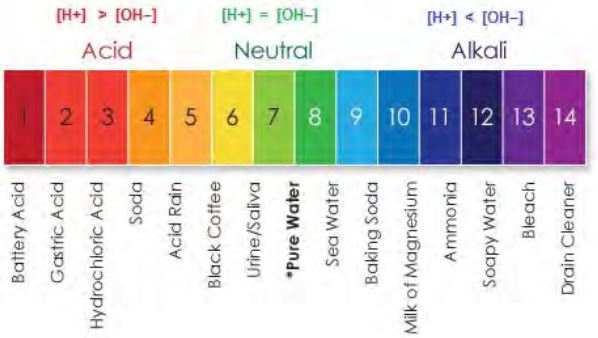
Knowledge Organiser – Chemical Changes

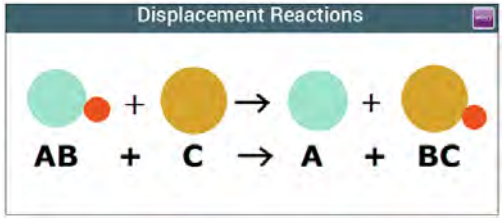
Key Terms

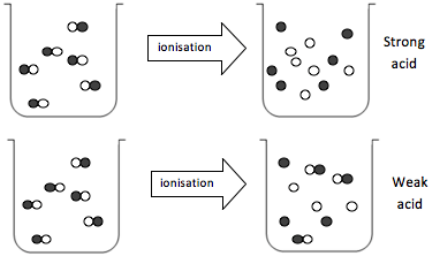
Reactivity series	An arrangement of metals in order of reactivity
Displacement reaction	Reaction where a more reactive element takes the place of a less reactive element in a compound
Oxidation	A reaction in which a substance loses electrons (gains oxygen)
Reduction	Reaction in which a substance gains electrons (loses oxygen)
Ore	A rock from which a metal can be extracted for profit
Acid	Solution with a pH less than 7; produces H^+ ions in water
Alkali	Solution with a pH more than 7; produces OH^- ions in water
Aqueous	Dissolved in water
Strong acid	Acid in which all the molecules break into ions in water
Weak acid	Acid in which only a small fraction of the molecules break into ions in water
Dilute	A solution in which there is a small amount of solute dissolved
Concentrated	A solution in which there is a lot of solute dissolved
Neutralisation	A reaction that uses up some or all of the H^+ ions from an acid
Electrolysis	Decomposition of ionic compounds using electricity
Electrolyte	A liquid that conducts electricity
Discharge	Gain or lose electrons to become electrically neutral
Inert electrodes	Electrodes that allow electrolysis to take place but do not react themselves

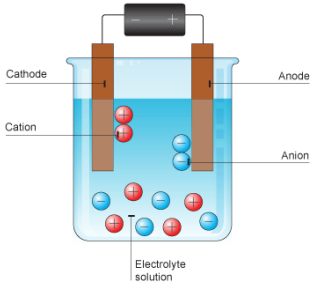
Diagrams











Acid + Alkali -> salt + water

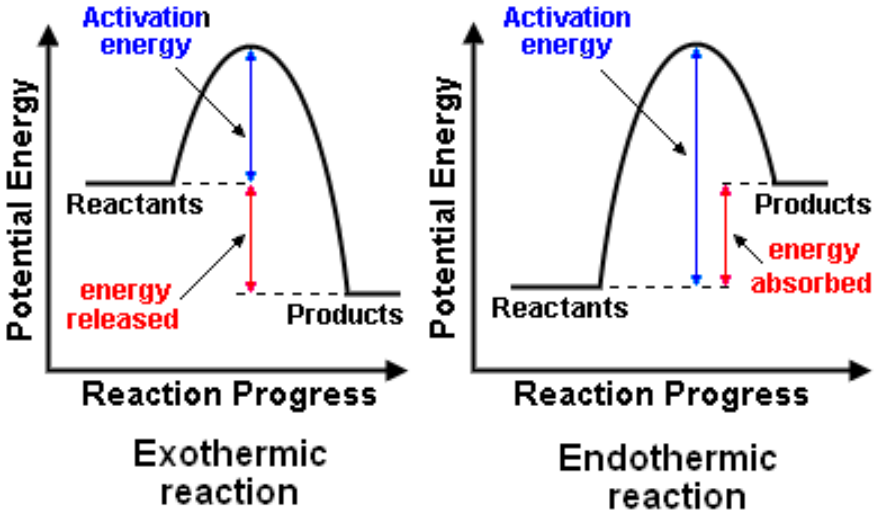
Metal + acid -> salt + hydrogen

Metal oxide + acid -> salt + water

Metal carbonate + acid -> salt + water + carbon dioxide

Knowledge Organiser – Energy Changes

Exothermic reaction	Reaction where thermal energy is transferred from the chemicals to the surroundings and so the temperature increases
Endothermic reaction	Reaction where thermal energy is transferred from the surroundings to the chemicals and so the temperature decreases
Activation energy	The minimum energy particles must have to react



Knowledge Organiser – Energy Changes

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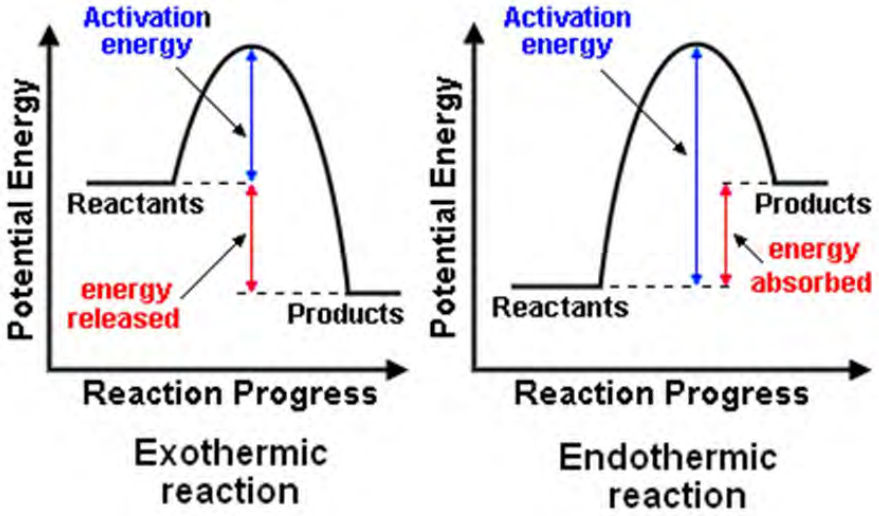


Knowledge Organiser – Formulae and equations

Key Terms

Diatomic molecule	A molecule containing two atoms
Spectator ions	Ions that do not take part in a reaction and do not appear in the ionic equation for the reaction
Ionic equation	Balanced equation for reaction that omits any spectator ions

Common Reactions

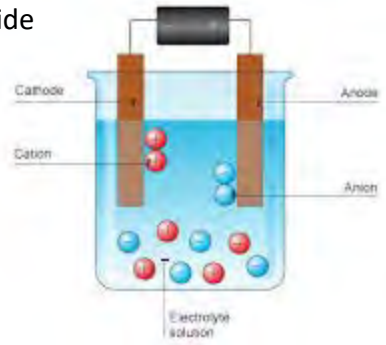
Element + oxygen -> oxide of element
Eg Calcium + oxygen -> calcium oxide
Compound + oxygen -> oxides of each element in compound
Eg Methane + oxygen -> carbon dioxide + water
Water + metal -> metal hydroxide + hydrogen (for metals that react with water)
Eg water + sodium -> sodium hydroxide + hydrogen
Acid + metal -> salt + hydrogen
Eg Hydrochloric acid + magnesium -> magnesium chloride + hydrogen
Acid + metal oxide -> salt + water
Eg Sulphuric acid + copper oxide -> copper sulphide + water
Acid + metal hydroxide -> salt + water
Eg nitric acid + potassium hydroxide -> potassium nitrate + water
Acid + metal carbonate -> salt + water + carbon dioxide
Eg hydrochloric acid + calcium carbonate -> calcium chloride + water + carbon dioxide
Acid + ammonia -> ammonium salt
Eg nitric acid + ammonia -> ammonium nitrate

Positive ions

Name	Formula
Hydrogen	H^+
Sodium	Na^+
Silver	Ag^+
Potassium	K^+
Lithium	Li^+
Ammonium	NH_4^+
Barium	Ba^{2+}
Calcium	Ca^{2+}
Copper(II)	Cu^{2+}
Magnesium	Mg^{2+}
Zinc	Zn^{2+}
Lead	Pb^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Aluminium	Al^{3+}

Negative ions

Name	Formula
Chloride	Cl^-
Bromide	Br^-
Fluoride	F^-
Iodide	I^-
Hydroxide	OH^-
Nitrate	NO_3^-
Oxide	O^{2-}
Sulfide	S^{2-}
Sulfate	SO_4^{2-}
Carbonate	CO_3^{2-}



Half Equations

$Fe_{(s)} + Cu^{2+} \longrightarrow Fe^{2+} + Cu_{(s)}$

Oxidation Half-Equation:

$Fe(s) \longrightarrow Fe^{2+} + 2e^-$

Reduction Half-Equation:

$Cu^{2+}{}_{(aq)} + 2e^- \longrightarrow Cu(s)$

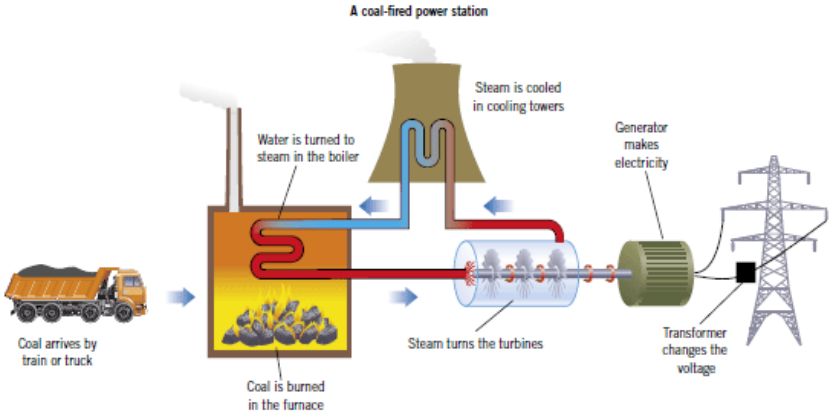
Diagrams

Knowledge Organiser – Energy

Key Terms

Specific heat capacity	The energy needed to raise the temperature of 1kg of a substance by 1°C.
Dissipate	To scatter in all directions or to use wastefully. When energy has been dissipated it means we cannot get it back. The energy has spread out and heats up the surroundings.
Non-renewable energy resources	Energy resources which will run out, because they are finite reserves, and which cannot be replenished.
Renewable energy resources	Energy resources which will never run out and (or can be) replenished as they are used.
Alternative energy resource	Resources other than fossil fuels. The resources may or may not be renewable. Nuclear power is not a renewable energy resource, but tidal power is. Alternative energy resources do not contribute to global warming.
Biofuel	Fuel produced from biological material. Biofuels are provided by trees such as willow that can be grown specifically as energy resources.

Diagrams



Energy Equations

Efficiency (%) = (useful energy out ÷ total energy in) x 100.

GPE = mgh — Gravitational Potential Energy = mass x gravity x height.

$E_e = \frac{1}{2}ke^2$ — Elastic potential energy = 0.5 x spring constant x extension^2

$KE = \frac{1}{2}mv^2$ — Kinetic Energy = 0·5 x mass x velocity^2.

W = F x d — work done = force x distance.

W = E — work done = energy transferred.

P = E ÷ t — power = energy ÷ time.

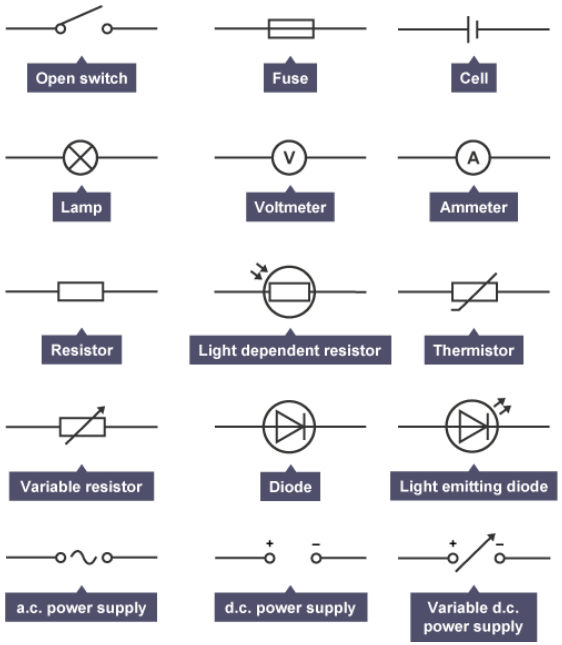
E = c x m x θ — energy = specific heat capacity x mass x change in temperature.

Knowledge Organiser – Electricity

Key Terms

Potential difference (p.d.)	A measure of the electrical work done by a cell (or other power supply) as charge flows round the circuit. Potential difference is measured in volts (V).
Electric current	A flow of electrical charge. The size of the electric current is the rate at which electrical charge flows round the circuit.
Resistor	A component that acts to limit the current in a circuit. When a resistor has a high resistance, the current is low.
Directly proportional	When two quantities are directly proportional, doubling one quantity will cause the other quantity will cause the other quantity to double. When a graph is plotted, the graph line will be straight and pass through the origin.
Inversely proportional	When two quantities are inversely proportional, doubling one quantity will cause the other quantity to halve
Ohmic	The current flowing through an ohmic conductor is proportional to the potential difference across it. If the p.d. doubles, the current doubles. The resistance stays the same.
Non-ohmic	The current flowing through a non-ohmic resistor is not proportional to the potential difference across it. The resistance changes as the current flowing through it changes.

Diagrams



P = V x I — power = voltage x current.

V = I x R — voltage = current x resistance.

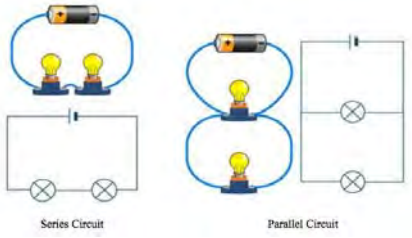
Q = I x t — charge = current x time.

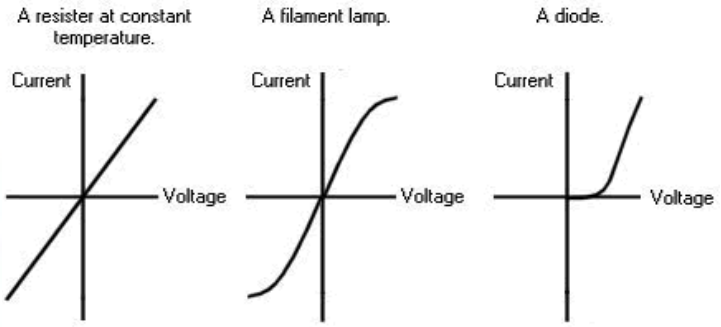
E = V x Q — energy = voltage x charge.

E = V x I x t — energy = voltage x current x time.

$\frac{V_p}{V_s} = \frac{N_p}{N_s}$ — transformer equation

Total cost = number of units x cost per unit.





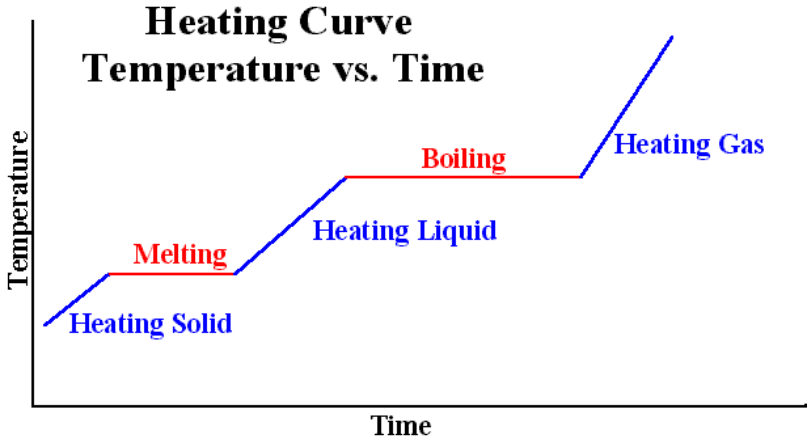
Key Terms

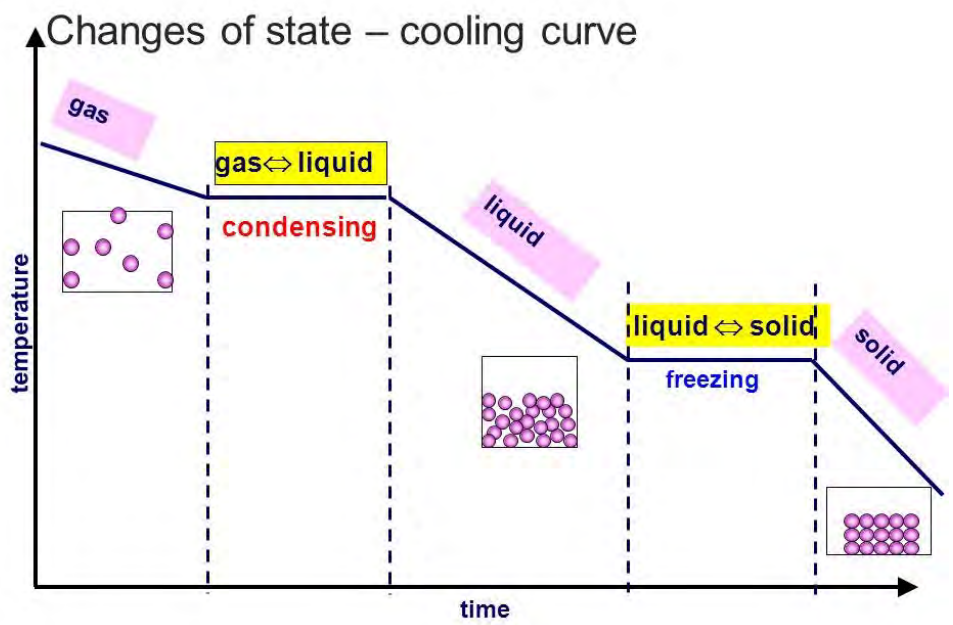
Knowledge Organiser – Particle Model of Matter

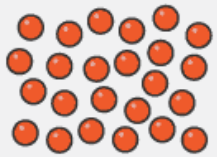
Diagrams

Equations

$\rho = m/v$	Density = Mass ÷ volume
$\Delta E = mc\,\Delta\theta$	Change in thermal energy = mass x specific heat capacity x temperature change
$E = mL$	Energy required to change state = mass x specific latent heat





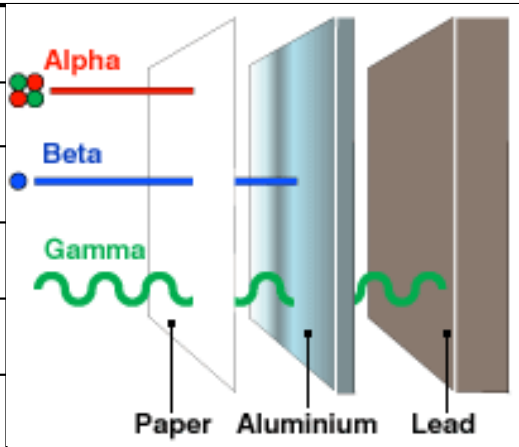
	Solid	Liquid	Gas
Arrangement of particles	Close together Regular pattern	Close together Random arrangement	Far apart Random arrangement
Movement of particles	Vibrate on the spot	Move around each other	Move quickly in all directions
Diagram			

Knowledge Organiser – Atomic Structure

Key Terms

Proton	A positively charged particle found in the nucleus of an atom.
Neutron	A neutral particle found in the nucleus of an atom.
Electron	Negatively charged particles found on energy levels (shells) surrounding the nucleus inside atoms.
Atomic number	Number of protons in an atom.
Mass number	Number of protons plus neutrons in an atom.
Isotope	Atoms with the same number of protons but a different number of neutrons.
Alpha particle	A particle formed from two protons and two neutrons.
Beta particle	A fast moving electron.
Gamma ray	An electromagnetic wave.
Geiger-Müller (GM) tube	A device which detects ionizing radiation. An electronic counter can record the number of particles entering the tube.
Half-life	The time taken for the number of nuclei in a radioactive isotope to halve. In one half-life the activity or count rate of a radioactive sample also halves.
1 Becquerel (1Bq)	An emission of 1 particle per second

Diagrams



$^{235}_{92}U$ decay by releasing an alpha particle $\rightarrow$ $^{4}_{2}\alpha$ + $^{231}_{90}Th$

$^{14}_{6}C$ decay by releasing an beta particle $\rightarrow$ $^{0}_{-1}\beta$ + $^{14}_{7}N$

$^{235}_{92}U$ decay by releasing a gamma wave $\rightarrow$ $^{0}_{0}\gamma$ + $^{235}_{92}U$