



The Academy  
at Shotton Hall

# YEAR 9 KNOWLEDGE ORGANISER

"KNOWLEDGE IS POWER"

Francis Bacon



KEY VOCAB

- Marks** - The name of the German currency.
- Kaiser** - German for Emperor or King.
- Strike** - When workers refuse to work.
- Abdicate** - To stand down from power.
- Exile** - To move to safety away from Germany
- Constitution** - A new set of rules about how a country is run.
- Republic** - A country without an emperor or royal family.
- Communist** - A different form of government with close links to Germany's enemy Russia.
- Reichstag** - The Germany government building (like the Houses of Parliament in the UK)
- Anarchy** - a time without rule or anyone in power.
- Democracy** - A country which allows its people to vote.
- Weimar Republic** - The democratic government established in Germany after World War I, lasting from 1919 to 1933.
- Treaty of Versailles** - The peace treaty signed in 1919 that officially ended World War I and imposed harsh terms on Germany
- Hyperinflation** - A severe economic crisis in the early 1920s in which the value of the German currency, the Reichsmark, became nearly worthless due to rapid and uncontrollable inflation.
- Great Depression** - The global economic downturn that began in 1929 and severely affected Germany's already fragile economy.

Year 9: Interwar Period 1918-1939

Why was the Weimar Republic created?

Between 11<sup>th</sup> November 1918 to July 1919, a new German Republic was created. It was called the **Weimar Republic** after the town where the new government was formed. Erbert knew he had to make sure Germany stayed peaceful and to re-gain the confidence of the German people after signing the hated armistice. The German people were used to the strong and hard, leadership of a Kaiser but things were very different now under Erbert's **democratic\*** control.

The Spartacist Uprising

The Spartacist Uprising was a revolutionary movement in Germany during January 1919. Led by the radical Spartacus League, primarily Karl Liebknecht and Rosa Luxemburg, the uprising aimed to overthrow the post-World War I Weimar government and establish a socialist state. However, the revolt was swiftly suppressed by the government's forces, leading to the deaths of its leaders. This event highlighted the power struggle and instability in the early days of the Weimar Republic.

The 'Golden Age

The Roaring Twenties, often referred to as the "Golden Age," was a period in Europe and USA during the 1920s. It followed the aftermath of World War I and was characterized by people having more money, cultural innovation, and social change. Advances in technology, such as the automobile and radio. The era saw the rise of new styles, including flapper fashion and jazz music, as well as the beginnings of modernist art and literature.

Adolf Hitler: Adolf Hitler became dictator of Germany through a combination of political maneuvering, exploitation of economic

turmoil, and suppression of opposition. After joining the National Socialist German Workers' Party (Nazi Party), he gradually rose within its ranks. In 1933, Hitler was appointed Chancellor by President Paul von Hindenburg, believing he could control Hitler and stabilize the government. However, Hitler swiftly consolidated power by exploiting the Reichstag Fire in February 1933, which led to the Reichstag Fire Decree, curtailing civil liberties. In March 1933, the Enabling Act granted Hitler the authority to pass laws without Reichstag approval, effectively ending democracy. Through strategic legal changes and intimidation, Hitler dissolved opposing parties and cemented his authority. By August 1934, President Hindenburg's death enabled Hitler to merge the positions of Chancellor and President, declaring himself Führer



THE EVENING MISSOURIAN

STATE DEPARTMENT SAYS  
GERMANY GAVE IN TO THE  
ALLY'S TERMS AT 5 A. M.

ARMISTICE IS SIGNED

EXTRA

WASHINGTON, Nov. 11, 1918. - Germany signed the armistice at 11 o'clock this morning, Paris time. This was the end of the European war. The armistice was signed at Compiègne, France, in a forest. The acceptance of peace was announced by the German government.

9<sup>th</sup> Nov 1918      11<sup>th</sup> Nov 1918

June 1919      1923

1924      1929.      1933.      1939

Kaiser Abdicated

Armistice signed

Treaty of Versailles Signed

Hyperinflation, Munich Putsch.

The Dawes Plan.

Wall Street Crash

Hitler Becomes Chancellor



# Year 9, Term 1

## Film Music



### Film Music Knowledge Organiser

Name .....

Class .....

#### The main purpose of music in Film

- To create an atmosphere or enhance a mood
- To set the scene and link scenes
- To show the historical period or geographical setting
- To support characters, events or situations through the use of a **leitmotif**
- To predict events or inform the audience of impending events, e.g. Jaws
- To emphasize a gesture (cartoons) – Mickey-Mousing
- To support the emotions of a character or evoke certain emotions in the audience
- To give 'commercial impetus' – 'big songs' help sell the film



#### Two main categories of Film Music

##### Diegetic

Music contained in the action, e.g., a singer performing to an audience in a bar. An integral part of the drama.

This is music that the on-screen characters can hear as well as the audience.

##### Non-Diegetic

The background music supporting on-screen action. It reflects the mood and reinforces the action.

This music is heard only by the audience.

Sometimes, there is a mix of both categories.

#### Types of Film (some)...

- Action/Adventure
- Animation
- Biography
- Comedy
- Crime
- Documentary
- Drama
- Fantasy
- Horror
- Musical
- Romance
- Sci-fi
- Spy
- Sport
- Thriller
- War
- Western



#### Film Music Composers

Jerry Goldsmith Star Trek, Alien,  
The Omen, Planet of the Apes  
Ennio Morricone The Good the Bad  
and the Ugly, The Mission, Exorcist II  
John Williams (SO MANY) Jaws,  
Star Wars, Harry Potter, Indiana  
Jones, War Horse, ET, Jurassic Park,  
Saving Private Ryan etc.  
Hans Zimmer Lion King, Gladiator,  
Pearl Harbour, Dunkirk  
James Horner  
Titanic, Apollo 13, Braveheart, Avatar  
Danny Elfman Batman, Spiderman  
Charlie & the chocolate factory  
Howard Shore Lord of the Rings,  
The Hobbit, Gangs of New York  
Thomas Newman Finding Nemo,  
Skyfall, Spectre, 1917

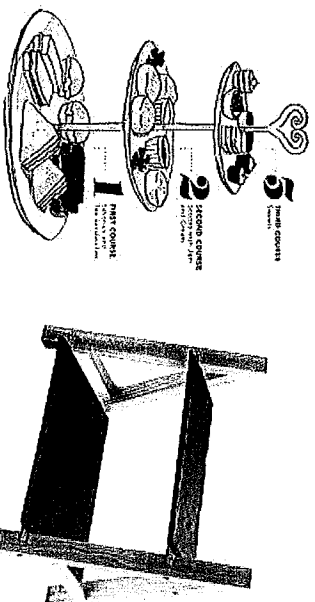
#### Key Film Music Terminology

**Leitmotif** - Frequently recurring melody or harmonic idea, associated with a character, event or situation  
**Theme song** - usually a popular song, used to help advertise and add add commercial impetus e.g., James Bond 'big songs'  
**Underscoring** – Music played at the same time as action or dialogue  
**Mickey-Mousing** – Where the music fits precisely with a specific part of the action in a film (cartoons especially)  
**Juxtaposition in film music** – Using music you would not normally hear, creating unease or even humour e.g., Gentle ballet music used in Horror  
**Ostinato** – Short, repeated pattern (builds tension)  
**Minimalism** - Style of music with short motifs, which evolve to create a hypnotic effect  
**Fanfare** – Short musical flourish or call to attention, often associated with an announcement or significant event  
**Sync point/Hit point** – Precise moment where the timing of the music must fit with the action  
**Click-Track** – Click metronome heard by composers and performers to help time the music exactly to the action  
**Storyboard** – graphic organiser with visual images to tell part of a story  
**Instrument Performing Techniques often used;**  
**Tremolo** – rapidly shaking the bow (builds tension)  
**Glissando** – sliding the notes (dramatic or comedic effect)

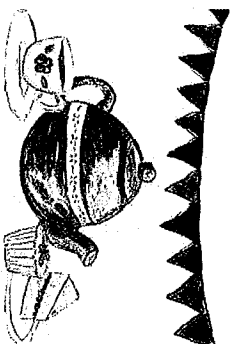
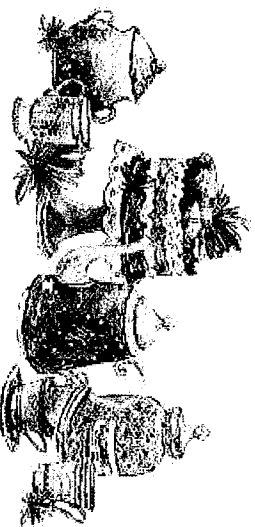




## YEAR 9 Afternoon Tea SKO



Presentation plates and ideas:  
Select plates/stands and dishes that will showcase your dishes. Think about how the dishes will allow you to plate up and the ease in which the customer will be able to select the dishes to eat.



### KEY VOCABULARY

#### Fine Dining

Caters to an upscale clientele and provides the highest quality of food. A fine dining restaurant has a formal atmosphere, is almost always a sit-down restaurant, and has a

#### Afternoon tea

Afternoon Tea is a tea-related ritual, introduced in Britain in the early 1840s. It evolved as a mini meal to stem the hunger and anticipation of an evening meal at 8pm.

#### Presentation techniques

Techniques used to make food look more attractive and appealing.

#### Creaming method

Cake making method where the butter and sugar is mixed together first, then the egg added and then the flour folded in gently

#### All-in-one method

Cake making method where all the ingredients are whisked together.

#### Finger sandwich

Sandwich that is easy to handle and can be eaten in two-three bites.

#### Egg wash

A beaten egg is used to brush the top of bread/pastry prior to baking.

### POINTS TO CONSIDER

#### Skills of staff

Dishes can only be put on the menu if the staff have the skills to produce them.

#### Themes

If there is a theme to the menu every element of the dish on the menu must fit with that theme. As this is what the customer will expect.

#### Seasonality

Seasonal foods that foods that are grown naturally in the in each season e.g. asparagus in spring, pumpkin in autumn.

#### Ingredients/equipment available

Dishes can only be put on the menu if the kitchen have the ingredients and equipment available to make those dishes

#### Types of customer

Different customers will have different needs and requirements from a product. Customers are people who purchase and/or consume the product.

#### Piping

Using piping bags and different nozzles to create different patterns using buttercream/ fresh cream or meringue by squeezing the filled bag.

#### Modelling

Use fondant icing to create shapes for decoration

#### Feathering

Where you cover your baked item with one colour of icing and then pipe thin parallel lines using a different coloured icing. Then you drag a skewer through the lines to create a wavy effect.

#### Lattice

Cross-crossing pattern of strips. Weaving lines of pastry over and under other strips of pastry.

#### Glazing

Coating of food such as bread or pastry before baking used egg, milk or another liquid to create an attractive finish

#### Crimping

Crimping the edges of pastry not only looks pretty but it helps keep the filling inside.

#### Positioning

The way you position the food on a plate can dramatically alter its appearance. Centre foods that are the same shape as the plate.



## RESEARCH

Remember that this does not need to be in written format BUT photographs of displays, printouts from the computer, leaflets, etc. must be produced as evidence that you have carried out the research or investigation. Answer the following questions using the internet to find out:

### What is afternoon tea?

- Where does it originate from? • What time is it eaten?
- How is it served? What beverages are served with afternoon tea?
- How much does it cost for 2 people to eat afternoon tea at e.g. Betty's or Harvey Nichols?
- How is afternoon tea presented?
- What does it look like?
- Consider the nutritional content of afternoon tea products. Analyse the nutritional content of a few items. Use bbcgoodfood.com (i.e. Mini quiche, ham and mustard sandwich, profiteroles). Comment whether these products are high in fat, salt, sugar, low in fibre, contain vitamins/minerals/protein are a carbohydrate etc.
- How are the products decorated?
- Draw a mind map of different dishes that could be served.
- Produce a table of suitable recipes you could make for the task.
- List the level of skill; high, medium or basic.
- Make an image board to show recipe ideas.
- Trial and test recipes in practical lessons.
- Watch demonstrations of recipes.
- Carry out a survey of varieties of products available for sale. Record your results in a table.
- Taste testing of different dishes suitable for afternoon tea.
- Make a fact file or information leaflet that could be used in a Hotel or restaurant to promote afternoon tea

## REASONS FOR CHOICE

**JUSTIFICATION AND REASONS FOR CHOICE** Research recipes and choose what you will make in the practical session. Remember the practical carries the most marks so make sure your choices is: • Suitable for the brief – each recipe must be suitable for afternoon tea. • You have the time, skill and equipment to make. • Recipes show a variety of colour, texture and flavours. • Show skills which reflect your ability.

**Higher Level Skills:** • Pasty making – short crust, pate sucre, choux • Roux based sauces • Meringues and pavlovas • Meat and fish cookery (using high risk foods) • Decorated cakes and gateaux • Rich yeast doughs including pizza, shaped bread rolls • Complex accompaniments and garnishes e.g. piping cream, coulis sauce, vegetable accompaniments.

**Medium Level Skills:** • Puff pastry items that need shaping but use readymade pastry • Vegetable and fruit dishes requiring even sizes • Cheesecakes and similar desserts • Simple sauces e.g. red wine sauce • Simple cakes, biscuits, cookies and scones • Complex salad with a homemade dressing such as mayonnaise

**Basic Skills:** • Crumbles • Sandwiches • Pizza with readymade base • Jacket potatoes • Simple salads • Assembling products e.g. using prepared sauces, bought meringue nests etc.

**JUSTIFICATION AND REASONS FOR CHOICE** Create a table with your 4 chosen dishes in. List the skills and cooking methods for each product. Write an introduction to the dishes you are going to make. Did you trial any of these dishes?

| Dish                          | Skills   | Cooking methods         |
|-------------------------------|--|-------------------------|
| Victoria sandwich cake        | Creaming method<br>Decorating, piping  | Baking                  |
| Strawberry Gateau             | Whisking method,<br>fruit preparation,<br>piping cream and<br>making chocolate<br>curls. | Baking and<br>chilling. |
| Stilton &<br>vegetable quiche | Shortcrust pastry,<br>making custard,<br>vegetable<br>preparation.                       | Baking and sauté.       |
| Shortbread<br>biscuits        | biscuit made by<br>the rubbing in<br>method  | baking.                 |

Write a paragraph for each product you are making. Explain why you are making the product, and how it is suitable for afternoon tea. i.e. Victoria Sandwich Cake Read the examples below and tailor these to your dish. This dish shows a variety of colours; state the colours used in each dish. I have trialled this dish so I know how long it will take to make/ know what it will look like. This dish is nutritionally balanced (contains carbohydrates, protein, vitamins and minerals, is low in salt, low in fat) This dish shows a variety of textures; chewy, crunchy, soft, crisp etc. This dish will demonstrate a range of skills such as....(creaming, pastry making, whipping, proving) This dish shows a variety of flavours. • Cost – state how economical the dishes chosen are. Use of staple or store cupboard ingredients, ingredients which are in season etc. This dish can be made in time available. This dish looks attractive with accompaniments and/or garnishing. This dish is saleable – customers in restaurant would want to buy them. This dish is easy to portion control and to serve. State how you will portion dishes; use of spoons, ladles etc. This dish would be suitable for making in bulk. This dish can be chilled/frozen for use another time. Chilled at 1-5GC and frozen at -18GC. Make a menu card to show the dishes you are making. Present attractively. You will need to display this with your food during the practical.



# Democracy – Y9 – P4L

## Key Words

**Democracy**  
Direct - Where the people decide on the policy directly, for example through a vote or referendum on each issue.  
Representative - When the citizens of a country elect representatives to make decisions on their behalf.

**The Duties of the Government**  
To protect citizens and keep them safe.  
To look after the welfare of citizens.  
To watch over the employment of citizens.  
To look after the environment.  
To run the economy.

**The Prime Minister**  
Leads government and directs government policy.  
Chooses Cabinet Ministers and chairs the Cabinet.  
Is the head of the armed forces.  
Appoints senior judges and archbishops in the Church of England.  
Represents the nation in international affairs.

**The Cabinet**  
The PM chooses a group of MPs to help run the country. This group is called the Cabinet.  
The Cabinet are the most important MPs. They get put in charge of the big departments such as education, health etc.  
The Cabinet works with the PM to decide the governments major policies.

**Voting**  
Every 5 years the country is asked to choose 1 person to represent them in the UK parliament. Those people who would like to be elected will campaign in your local area to try and get your vote. The candidates in each constituency will be attached to a political party.  
All of the political parties in the UK have a leader. Those people will then campaign to encourage people to vote for their party allowing them to become Prime Minister. They will travel around the country meeting people and discussing their policies. The majority of people who are over the age of 18 will then be asked to go to the polling station to vote for their favourite. The party with the majority of the votes wins.

**Who can vote?**  
Anyone over the age of 18 who is registered with the local council.

**Who cannot vote?**  
Under 18, embers of the House of Lords, in prison, mental illnesses, anyone found guilty of breaking election law in the last five years

**Pressure Groups**  
A pressure group is an organised group of people who seek to influence and change government policy or legislation (law).  
These groups of people have very strong opinions on a particular issue and often will try to influence what happens in government by putting pressure on MPs and people who make decisions.  
They are sometimes referred to as 'lobby groups' or 'interest groups'.  
Methods used: Campaigning, petitions, lobbying, writing or meeting an MP, marching etc

## Parliament

- House of Commons - All of the MPs elected by UK citizens in the general election. Each represents their own constituency.
- House of Lords - All of the Peers. They are unelected. They are nominated experts in their fields. The Prime Minister has a large say in who becomes a Peer.
- The Monarch - The King or Queen at the time. They have less power now but still have the final sign-off on laws and on Peerages.

In the House of Commons MPs: make laws, examine the work of the Government by asking questions and having debates, keep a check on government spending, represent their constituencies and the interests of their people.

In the House of Lords they: check on the House of Commons and make sure laws are not rushed, criticise the government if it thinks that it has become too powerful, hold debates on important issues.

## Local Council/Government

Councils are responsible for many of the services in your local area. Most people want to live in clean, quiet streets where people get on with each other, to have their rubbish collected regularly, and to walk and play in well-kept parks. These services make a big difference to the quality of people's everyday lives.

Services provided: waste collection and disposal, recycling and waste management, local planning functions, grounds maintenance, street cleaning, public conveniences etc.

**Why do people vote?**  
Gives you the power to create change, people have fought for you to have the right to vote, their vote will make a difference

**Why people don't vote**  
They think politics is boring, some people are too young to vote, they are too busy

**How can voting be encouraged?**  
Electronic voting, making voting compulsory, target young people

**Should the age of voting be lowered to 16?**  
Yes – they deserve to have a say, it would get younger people interested in politics, increase turnout  
No – Immature choices, they have not learned enough through education and experience, it could create calls for it to be lowered again – where do we draw the line?

## Political parties

The ideas of a political party are written down in a document called a manifesto. The party manifesto provides the basis for action should a party win an election.

There are several different parties in the UK each with different ideas and policies. The largest parties include the Conservative Party, the Labour Party, the Liberal Democrat Party, the United Kingdom Independence Party (UKIP) and in Scotland, the Scottish National Party. There are other smaller parties such as the Green Party and Plaid Cymru, the Welsh nationalist party. Northern Ireland has a number of other, different parties.

**Constituency** - The UK is currently divided into 650 parliamentary constituencies, each of which is represented by one MP in the House of Commons.

**Democracy** – 'ruled by the people' a system of government who have been elected by the people, thought of as allowing freedom of speech, religion and political opinion

**General Election** - When the citizens of a country vote to elect a new government. A general election in the UK usually happens once every 5 years.

**Government** – The individuals who have been elected to run the state, led by the Prime Minister (PM) in the UK.

**Lobbying** - A person or group of people meeting or taking action (eg writing letters, demonstrating, petitioning) to try to persuade a politician to take up their cause.

**Local Government** - A system of government that operates at a local level providing services to its community.

**MP** – Member of Parliament

**Parliament** - The institution of Government in the UK. It comprises of three parts: the House of Commons, the House of Lords and the monarch.

**Political Party**– a group of people with similar political goals and opinions. Examples: Labour Party, Conservative Party, Liberal Democrat

**Pressure group** - An organised group of people who take action together to try to bring about change regarding a specific issue.



Resilience means being able to cope with difficult life events and bounce back afterwards. Resiliency is the process of adapting when you are faced with trauma, stress or any kind of adversity or emotional suffering.

Being resilient does not mean that you don't experience pain and hurt. Someone who is resilient faces tough life situations head-on, experiencing the difficult times and emotions. They process these challenging times by working through difficult emotions, building trust in themselves and their ability to cope through hard times.

### AUTOMATIC NEGATIVE THOUGHTS

*I'm a loser.*

*No one likes me.*

*Nobody loves me.*

*It's all my fault. I upset her.*

*I always get in trouble.*

*What if everyone leaves me?*

*Everone hates me.*

*I can't do this.*

*I'm so angry.*

*I hate myself.*

*Let's not try.*

*Now everything is ruined.*

*I will never be any good.*

*My life is terrible.*

### WAYS TO CHALLENGE NEGATIVE THOUGHTS

**What is another possibility?**

**What would the people who care about me say?**

**What is the worst that could really happen?**

**If my friend had this thought, what would I tell them?**

**Can I be 100% sure this is true?**

**If the worst really did happen, what could I do to deal with it and who could help me?**

**What is the best possible outcome?**

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**SUPPORT**  
**Young Minds** [www.youngminds.org.uk](http://www.youngminds.org.uk)  
**Childline** - [www.childline.org.uk](http://www.childline.org.uk)  
 Phone: 0800 1111  
**Samaritans** - [www.samaritans.org](http://www.samaritans.org)

## Mental Wellbeing – Y9 – P4L

### What is mental wellbeing?

Mental wellbeing doesn't have one set meaning. We might use it to talk about how we feel, how well we're coping with daily life or what feels possible at the moment.

Good mental wellbeing doesn't mean you're always happy or unaffected by your experiences. But poor mental wellbeing can make it more difficult to cope with daily life.

| Video Clip Topic | Signs that might mean someone has this mental health issue   | Strategies and treatments  | Ways others can help   |
|------------------|--|--|--|
| Depression       | Feels like 'something is missing'<br>Feel like cannot cope<br>Withdrawn, pulling out of activities<br>Note that a person may not always be sad or in a difficult life situation          | Medication - can provide relief while building other support strategies<br>CBT - practical techniques<br>Activities e.g. photography and going for a walk<br>Sport/physical activity                                     | Normal routine helpful<br>Show understanding<br>Say someone is there who can help<br>Text asking if okay to call, or send an emoji             |
| Anxiety          | Physical symptoms e.g. shaking, heart palpitations, pins and needles, stomach pains.<br>Withdrawn<br>Seeking reassurance<br>Perfectionism<br>Can be linked with depression               | CBT<br>Yoga and Pilates<br>Meditation<br>Diary to reassess that things will pass<br>Small steps to build confidence<br>Talking to family and friends<br>Avoid researching physical symptoms as this can increase anxiety | Be patient and reassuring (but also help the person to have faith in their own decisions)<br>Remind them that anxiety does not define a person |
| Stress           | Disrupted sleep cycle<br>False FFF (fight, flight, freeze) responses (i.e. so wired that small stressors provoke big reactions e.g. angry outbursts)<br>Can cause depression and anxiety | Mind tools<br>Exercise<br>Quality sleep<br>Relaxation<br>Sharing feelings with friends   |  |

### Is mental health as important as physical health?

Mental and physical health are equally important components of overall health. For example, depression increases the risk for many types of physical health problems, particularly long-lasting conditions like diabetes, heart disease and stroke. Similarly, the presence of chronic conditions can increase the risk for mental illness. The opposite is true as well. According to studies, mental health problems can cause your physical health to deteriorate. For example: if you have chronic anxiety and depression, you may have trouble sleeping, thus, putting your physical health at risk.

### KEY WORDS:

**Anxiety:** is what we feel when we are worried, tense or afraid – particularly about things that are about to happen, or which we think could happen in the future

**Depression:** is a low mood that lasts for a long time, and affects your everyday life

**Panic attacks:** are a type of fear response. They're an exaggeration of your body's normal response to danger, stress or excitement.

**Stress:** is how we react when we feel under pressure or threatened. It usually happens when we are in a situation that we don't feel we can manage or control.

Mindfulness is a technique you can learn which involves noticing what's happening in the present moment, without judgement. You might take notice and be aware of your mind, body or surroundings. Mindfulness aims to help you:

- become more self-aware
- feel calmer and less stressed



# Y9: Layers

## Key Figures

### Ansel Adams



Ansel Easton Adams was an American landscape photographer and environmentalist known for his black-and-white images of the American West. He helped found Group f/64, an association of photographers advocating "pure" photography which favoured sharp focus and the use of the full tonal range of a photograph.

### Dan Mountford



Dan Mountford was born and raised in Milton Keynes but currently lives and works in Brighton. He studied Graphic Design at the University of Brighton. He is a freelance graphic designer and photographer. He works with a wide variety of disciplines like photography, illustrations, editorials and motion design.

### Double Exposure



Double exposure is a technique that combines two different exposures or images that are layered on top of each other. The image overlaid is less than full opacity so a bit of both images can be seen producing an almost ghost-like image.

### Digital Art



Art created using digital methods – a computer, tablet or even an app. Adobe Creative Suite has software able to create digital art.

## Key Terms

|                  |  |
|------------------|--|
| Architecture     | The art and technique of designing and building.   |
| Background       | The part of a picture, scene, or design that forms a setting for the main figures or objects, or appears furthest from the viewer.   |
| Blending         | The technique of gently intermingling two or more colors or values to create a gradual transition or to soften lines.  |
| Colour           | What the eye sees when light is separated.   |
| Colour symbolism | The use of colour as a symbol that represents a meaning or feeling. This can be different in various cultures or time periods.   |
| Composition      | Composition is the way in which different elements of an artwork are combined or arranged.   |
| Decorative       | Additions to make something look more attractive; ornamental.  |
| Digital          | Digital art refers to any artistic work or practice that uses digital technology as part of the creative or presentation process.  |
| Double Exposure  | Double exposure is a technique that combines two different exposures or images that are layered on top of each other. The image overlaid is less than full opacity so a bit of both images can be seen producing an almost ghost-like image. |
| Foreground       | The part of a view that is nearest to the observer, especially in a picture or photograph.   |
| Form             | An element in art where an object appears to have three-dimensions.  |
| Landscape        | Landscape art, is the depiction of natural scenery such as mountains, valleys, trees, rivers, and forests.   |
| Layer            | Layering in art is the process of applying various materials or colours on top of one another.   |
| Line             | A line is a mark made in art. A line has a width and a length. A line can be straight, curved, continuous, dashed or broken.   |
| Proportion       | Proportion is a principle of art that describes the size, location or amount of one element to another (or to the whole) in a work.  |
| Symbol           | A thing that represents or stands for something else.  |
| Tone             | Light to dark shade used to create form in an artwork.   |
| Transparency     | The quality of being able to see through (or partially see through) one or more layers in an artwork.  |

**Knowledge Links: Computer Science, Geography, History**

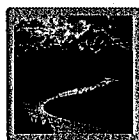


SMSC: Creative Thinkers

## Timeline

Ansel Adams is born

1902



Ansel Adams first published some of his photographs in the Sierra club bulletin

1922

Ansel Adams dies

1984



Dan Mountford's work goes viral on Tumblr

1991

Dan Mountford is born

2014



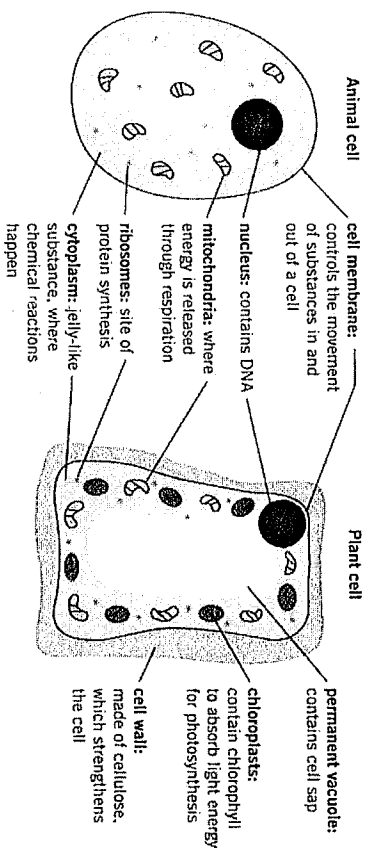


# Cells and Organisation 2A

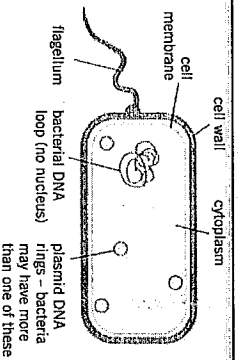
## Knowledge Organiser

### Animal and Plant Cells

Animal and plant cells are eukaryotic cells. They have genetic material (DNA) that forms chromosomes and is contained within a nucleus.



### Bacterial cells



Bacteria have the following characteristics:

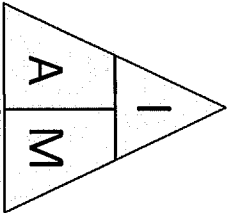
- Single-celled
- No nucleus - have a single loop of DNA
- Have small rings of DNA called plasmids
- Smaller than eukaryotic cells

### Comparing sub-cellular structures





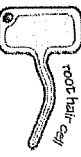
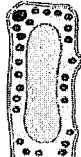
| Structure             | Animal | Plant | Bacteria |
|-----------------------|--------|-------|----------|
| cell                  | /      | /     | /        |
| membrane              | /      | /     | /        |
| cytoplasm             | /      | /     | /        |
| nucleus               | /      | /     | -        |
| cell wall             | -      | /     | /        |
| chloroplasts          | -      | /     | -        |
| permanent vacuole     | -      | /     | -        |
| DNA free in cytoplasm | -      | -     | /        |
| plasmids              | -      | -     | /        |

### Microscopes

| Light microscope            | Electron microscope                     |
|-----------------------------|---|
| Uses light to form images   | Uses a beam of electrons to form images |
| Living samples can be views | Samples cannot be living                |
| Relatively cheap            | expensive                               |
| Low magnification           | High magnification                      |
| Low resolution              | High resolution                         |



### Specialised cells

| Specialised cell  | Function                                    | Adaptations  |
|---|---|--|
|  | Fertilise an ovum (egg)                     | <ul style="list-style-type: none"> <li>- Tail to swim to the ovum and fertilise it</li> <li>- Lots of mitochondria to release energy from respiration, enabling the sperm to swim to the ovum</li> </ul>   |
|  | Transport oxygen around the body            | <ul style="list-style-type: none"> <li>- No nucleus so more room to carry oxygen</li> <li>- Contain a red pigment called hemoglobin that binds to oxygen molecules</li> <li>- Flat bi-concave disc shape to increase surface area-to-volume ratio</li> </ul>               |
|  | Contract and relax to allow movement        | <ul style="list-style-type: none"> <li>- Contains protein fibres, which can contract to make the cells shorter</li> <li>- Contains lots of mitochondria to release energy from respiration, allowing the muscles to contract</li> </ul>                                    |
|  | Carry electrical impulses around the body   | <ul style="list-style-type: none"> <li>- Branched endings, called dendrites, to make connections with other neurones or effectors</li> <li>- Myelin sheath insulates the axon to increase the transmission speed of the electrical impulses.</li> </ul>                    |
|  | Absorb mineral ions and water from the soil | <ul style="list-style-type: none"> <li>- Long projection speeds up the absorption of water and mineral ions by increasing the surface area of the cell</li> <li>- Lots of mitochondria to release energy for the active transport of mineral ions from the soil</li> </ul> |
|   | Enable photosynthesis in the leaf           | <ul style="list-style-type: none"> <li>- Lots of chloroplasts containing chlorophyll to absorb light energy</li> <li>- Located at the top surface of the leaf where it can absorb the most light energy</li> </ul>   |

### Key terms

chloroplast chromosome cytoplasm eukaryotic prokaryotic respiration ribosome

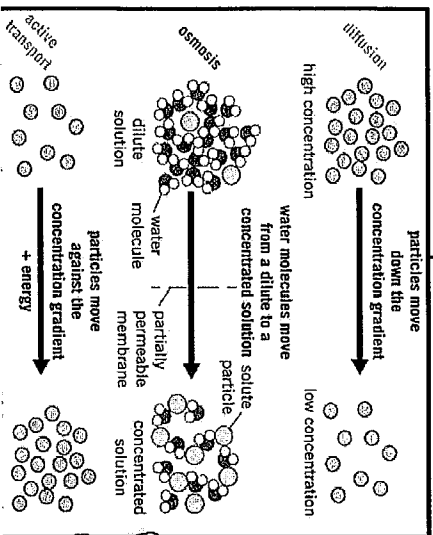




# Cells and Organisation 2A

## Knowledge Organiser

| Diffusion   | Osmosis   | Active Transport   |
|---|---|--|
| <p><b>Definition</b></p> <p>The spreading out of particles, resulting in a net movement from an area of higher concentration to an area of lower concentration.</p> <p><b>Movement of particles</b></p> <p>Particles move down the concentration gradient - from an area of high concentration to an area of low concentration.</p> <p><b>Energy required?</b></p> <p>No - passive process</p> <p><b>Examples</b></p> <ul style="list-style-type: none"> <li>Humans: <ul style="list-style-type: none"> <li>Nutrients in the small intestine diffuse into the blood in the capillaries through the villi.</li> <li>Oxygen diffuses from the air in the alveoli into the blood in the capillaries. Carbon dioxide diffuses from the blood in the capillaries into the air in the alveoli.</li> <li>Urea diffuses from cells into the blood for excretion by the kidney.</li> </ul> </li> <li>Fish: <ul style="list-style-type: none"> <li>Oxygen from water passing over the gills diffuses into the blood in the gill filaments.</li> <li>Carbon dioxide diffuses from the blood in the gill filaments into the water.</li> </ul> </li> <li>Plants: <ul style="list-style-type: none"> <li>Carbon dioxide used for photosynthesis diffuses into leaves through the stomata.</li> <li>Oxygen produced during photosynthesis diffuses out of the leaves through the stomata.</li> </ul> </li> </ul> | <p><b>Definition</b></p> <p>The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.</p> <p><b>Movement of particles</b></p> <p>Water moves from an area of lower solute concentration to an area of higher solute concentration.</p> <p><b>Energy required?</b></p> <p>No - passive process</p> <p><b>Examples</b></p> <p>Plants: Water moves osmosis from a dilute solution in the soil to a concentrated solution in the root hair cell.</p> | <p><b>Definition</b></p> <p>The movement of particles from a more dilute solution to a more concentrated solution using energy from respiration.</p> <p><b>Movement of particles</b></p> <p>Particles move against the concentration gradient - from an area of low concentration to an area of high concentration.</p> <p><b>Energy required?</b></p> <p>Yes - using energy released during respiration</p> <p><b>Examples</b></p> <p>Humans: Active transport allows sugar molecule to be absorbed from the small intestine when the sugar concentration is higher in the blood than in the small intestine.</p> <p>Plants: Active transport is used to absorb mineral ions into the root hair cells from more dilute solutions in the soil.</p> |



| Factors that affect the rate of diffusion  |   |   |
|--|---|---|
| <p><b>1) Difference in concentration</b></p> <p>The steeper the concentration gradient the faster the rate of diffusion.</p> | <p><b>2) Temperature</b></p> <p>The higher the temperature, the faster the rate of diffusion.</p> | <p><b>3) Surface area of the membrane</b></p> <p>The larger the membrane surface area the faster the rate of diffusion.</p> |

### Adaptations for exchanging substances

Single-celled organisms have a large surface area-to-volume ratio. This allows enough molecules to move across their cell membranes to meet their needs.

Multicellular organisms have a small surface area-to-volume ratio. This means they need specialized organs and cells to be transported into and out of their cells.

Exchange surfaces work most efficiently when they have a large surface area, a thin membrane, and a good blood supply.

|   |  |
|---|--|
| <p><b>Villi in the small intestine</b><br/>for absorbing nutrients</p> <p>• large surface area due to folding<br/>• thin wall (only one cell thick)<br/>• good blood supply</p>                                     | <p><b>Alveoli in the lungs</b><br/>for gas exchange</p> <p>• network of capillaries provides a good blood supply<br/>• The rate of diffusion is increased because the membrane of the alveoli:<br/>• is moist<br/>• has a large surface area<br/>• is only one cell thick (short diffusion pathway).</p> |
| <p><b>Fish gills</b><br/>for gas exchange</p> <p>• a network of capillaries (good blood supply)<br/>• a large surface area to increase diffusion<br/>• Fish gills are made up of stacks of thin filaments with:</p> | <p><b>Root hair cells</b><br/>for uptake of water and minerals</p> <p>• large surface area helps efficient absorption of water and mineral ions<br/>• oses of mitochondria to take in mineral ions by active transport</p>   |

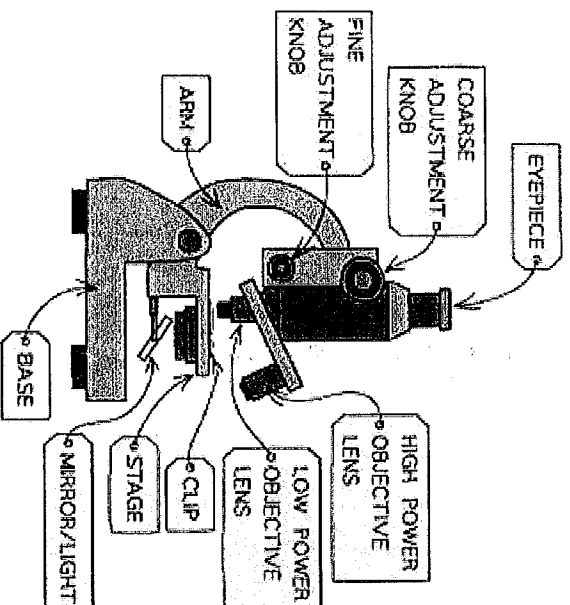
| Key terms                    |
|------------------------------|
| concentration gradient       |
| partially permeable membrane |
| stomata                      |
| urea                         |
| villi                        |
| capillaries                  |
| alveoli                      |
| diffusion                    |
| active transport             |
| passive process              |



# Using a microscope

## Knowledge Organiser

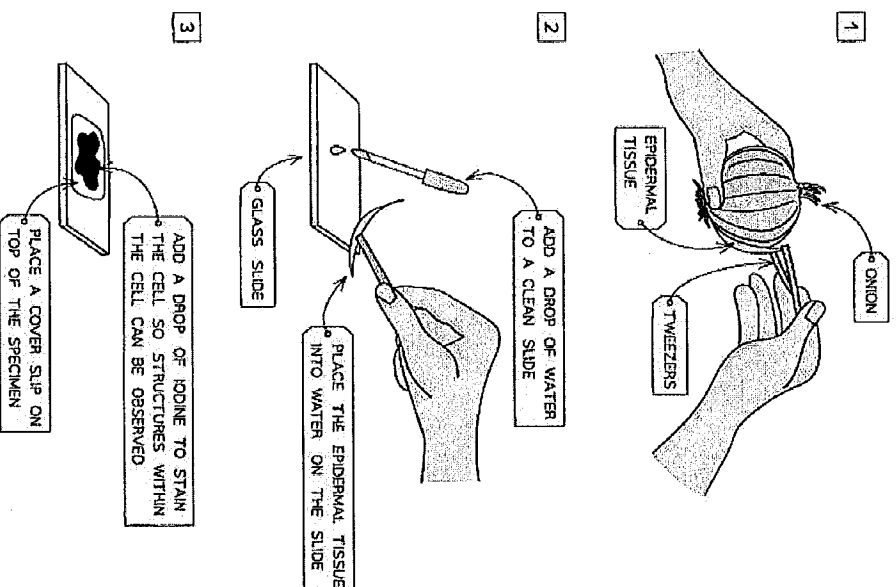
### Parts of a microscope



### Using a microscope

1. Clip slide onto the stage
2. Ensure the lowest powered objective lens is over the slide.
3. Use the coarse adjustment knob to bring the stage up just below the lens.
4. Look down the eye piece and gradually move the stage downwards using the coarse adjustment knob. Stop when the image is roughly in focus.
5. To bring the image into focus adjust the fine adjustment knob until a clear image is obtained.
6. To observe the image with a higher magnification, change the objective lens to a higher power and readjust the stage using the coarse and fine adjustment knobs.

### Making an onion slide



### Conversions

To convert micrometres into millimetres you should divide the measurement by 1000.

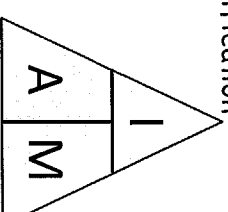
To convert millimetres into micrometres you should multiply the measurement by 1000.

### Calculations

magnification = image size / actual size

actual size = image size / magnification

image size = actual size x magnification



total magnification = eye piece x objective

### Microscopes

| Light microscope            | Electron microscope                     |
|-----------------------------|---|
| Uses light to form images   | Uses a beam of electrons to form images |
| Living samples can be views | Samples cannot be living                |
| Relatively cheap            | expensive                               |
| Low magnification           | High magnification                      |
| Low resolution              | High resolution                         |

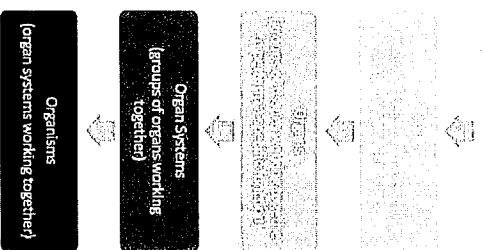


# Cells and Organisation 2B

## Knowledge Organiser

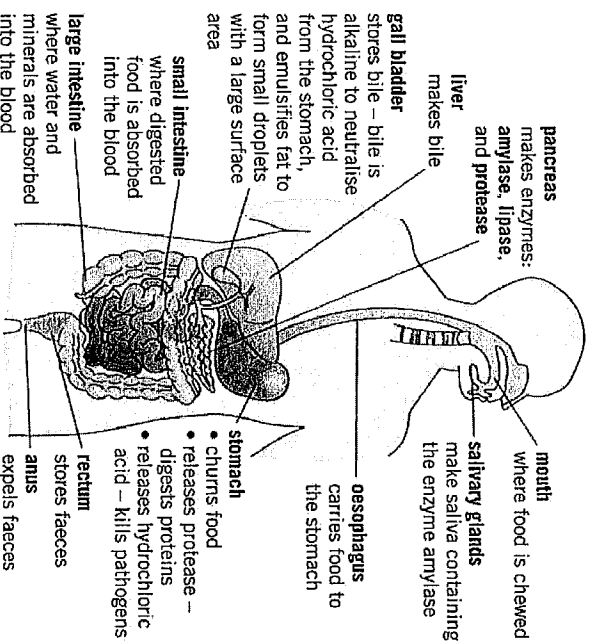
### Organisation of living things

There are five levels of organisation in living organisms:



### The Digestive System

The role of the digestive system is to break large insoluble molecules into smaller soluble molecules. Here are the organs that make up the digestive system and their roles in digestion.



### Digestive Enzymes

| Enzyme    | Sites of production                            | Reaction catalysed                |
|-----------|--|-----------------------------------|
| Amylase   | salivary glands<br>pancreas<br>small intestine | Starch → glucose (a simple sugar) |
| Proteases | stomach<br>pancreas<br>small intestine         | Proteins → amino acids            |
| Lipases   | pancreas<br>small intestine                    | Lipids → fatty acids and glycerol |

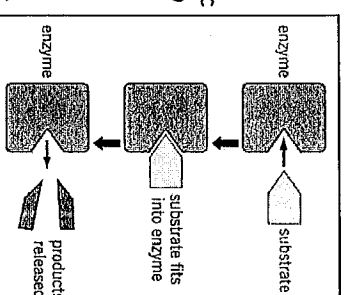
### Enzymes

Enzymes are large proteins that catalyse (speed up) reactions. Enzymes are not changed in the reactions they catalyse.

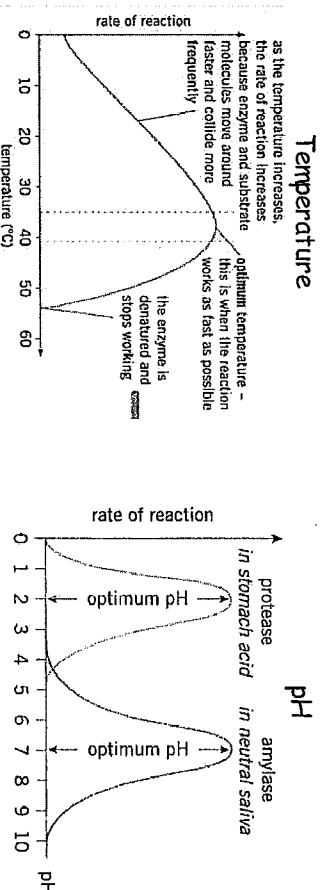
Lock and Key Model

This is a simple model of how enzymes work:

- 1) The enzyme's active site (where the reaction occurs) is a specific shape.
- 2) The enzyme (the lock) will only catalyse a specific reaction because the substrate (the key) fits into its active site.
- 3) At the active site, enzymes can break molecules down into smaller ones or bind small molecules together to form larger ones.
- 4) When the products have been released, the enzyme's active site can accept another substrate molecule.



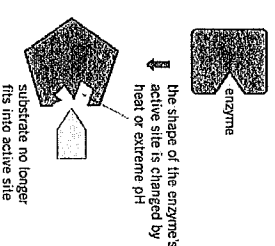
### Factors affecting enzymes



### Denaturation

At extremes of pH or at very high temperatures the shape of an enzyme's active site can change.

The substrate can no longer bind to the active site, so the enzyme cannot catalyse the reaction – the enzyme has been denatured.





# Cells and Organisation 2B




## Knowledge Organiser

### The blood

The blood is a tissue made up of four main components:

1. **Red blood cells** - bind to oxygen and transport it around the body.
2. **Plasma** - transports substances and blood cells around the body.
3. **Platelets** - form blood clots to create barriers to infections.
4. **White blood cells** - part of the immune system to defend the body against pathogens.

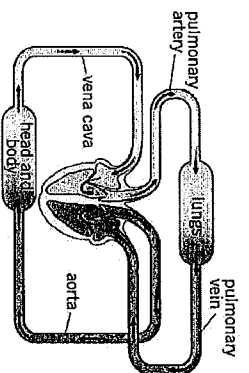
### The blood vessels

| Vessel    | Function   | Structure  | Diagram  |
|-----------|--|--|--|
| artery    | carries blood away from the heart under high pressure              | <ul style="list-style-type: none"> <li>- Thick, muscular and elastic walls</li> <li>- Walls that stretch to withstand high pressure</li> <li>- Small lumen</li> </ul>  |  <p>thick wall<br/>small lumen<br/>thick layer of muscle and elastic fibres</p> |
| vein      | carries blood to the heart under low pressure                      | <ul style="list-style-type: none"> <li>- Have valves to stop blood flowing the wrong way</li> <li>- Thin walls</li> <li>- Large lumen</li> </ul>   |  <p>relatively thin wall<br/>large lumen<br/>often has valves</p>                |
| capillary | carries blood to tissues and cells and connects arteries and veins | <ul style="list-style-type: none"> <li>- One cell thick - short diffusion distance for substances to move between the blood and tissues (e.g., oxygen into cells and carbon dioxide out)</li> <li>- Very narrow lumen</li> </ul> |  <p>wall one-cell thick<br/>tiny vessel with narrow lumen</p>                    |

### Double circulatory system

The human circulatory system is described as a double circulatory system because blood passes through the heart twice for every circuit around the body:

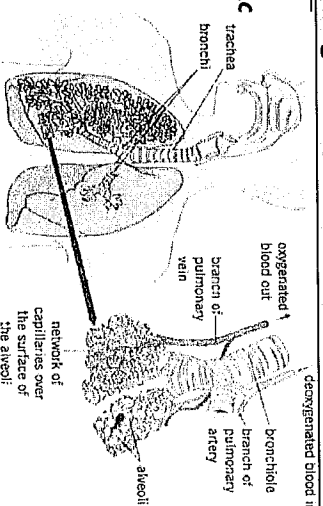
- The right ventricle pumps blood to the lungs where gas exchange takes place
- The left ventricle pumps blood around the rest of the body.



### The lungs

The heart is an organ that pumps blood around your body. It is made from cardiac muscle tissue, which is supplied with oxygen by the **coronary artery**.

Heart rate is controlled by a group of cells in the right atrium that generate electrical impulses, acting as a pacemaker. Artificial pacemakers can be used to control irregular heartbeats.



### Coronary heart disease

Coronary heart disease (CHD) occurs when the coronary arteries become narrowed by the build-up of layers of fatty material within them. This reduces the flow of blood, resulting in less oxygen for the heart muscle, which can lead to heart attacks.

|                          | Description   | Advantages  | Disadvantages  |
|--------------------------|---|---|--|
| Stent                    | Inserted into blocked coronary arteries to keep them open.  | <ul style="list-style-type: none"> <li>- Widens the artery - allows more blood to flow</li> <li>- Less serious surgery</li> </ul>   | <ul style="list-style-type: none"> <li>- Can involve major surgery - risk of infection, blood loss and clot clots</li> <li>- Risks from anaesthetic</li> </ul>   |
| Statins                  | Drugs that reduce blood cholesterol levels, slowing down the deposit of fatty material in the arteries  | <ul style="list-style-type: none"> <li>- Effective</li> <li>- No need for surgery</li> <li>- Can prevent CHD from developing</li> </ul>                                   | <ul style="list-style-type: none"> <li>- Possible side effects such as muscle pain, headaches and sickness</li> <li>- Cannot cure CHD, so patient will have to take tablets for many years.</li> </ul> |
| Replacement heart valves | Heart valves that leak or do not open fully, preventing control of blood flow through the heart, can be replaced with biological or mechanical valves.  | <ul style="list-style-type: none"> <li>- Allows control of blood flow through the heart</li> <li>- Long-term cure for faulty heart valves</li> </ul>                      | <ul style="list-style-type: none"> <li>- Risks related to surgery (as with stents)</li> </ul>  |
| Transplants              | If the heart fails a donor heart, or heart and lungs, can be transplanted. Artificial hearts can be used to keep patients alive whilst waiting for a transplant, or to allow the heart to rest during recovery. | <ul style="list-style-type: none"> <li>- Long-term cure for the most serious heart conditions</li> <li>- Treats problems that cannot be treated in other ways.</li> </ul> | <ul style="list-style-type: none"> <li>- Transplants may be rejected if the donor is not a match.</li> <li>- Lengthy process</li> <li>- Risks related to surgery (as with stents)</li> </ul>           |

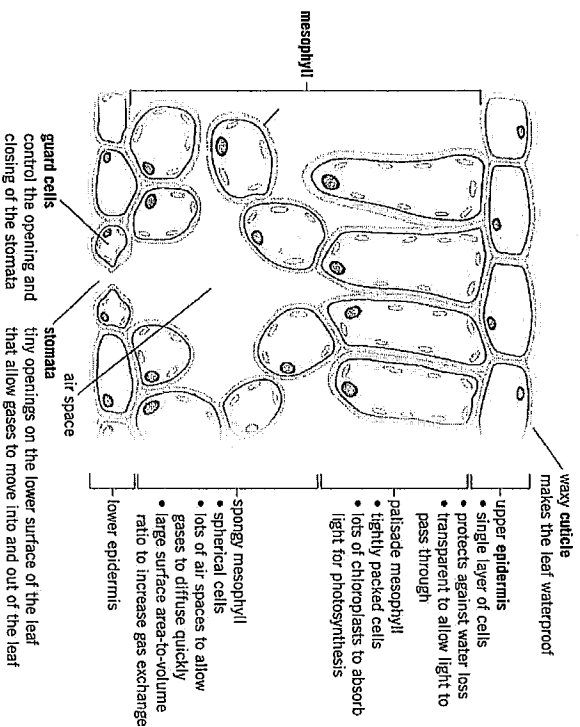


# Cells and Organisation 2B

## Knowledge Organiser

### Tissues in a leaf

Leaves are organs because they contain many tissues that work together to perform photosynthesis.

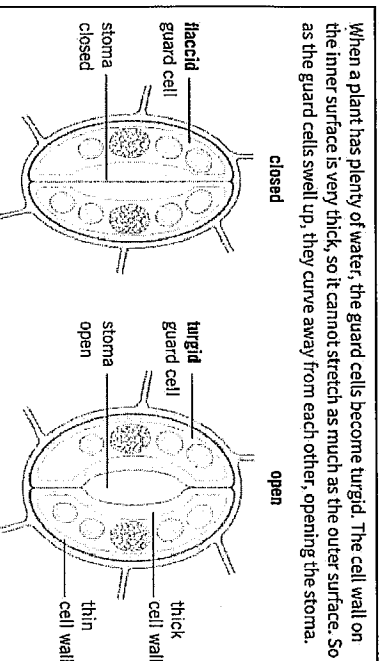


### Stomata

Stomata are tiny openings in the undersides of leaves - this placement reduces water loss through evaporation.

They control gas exchange and water loss from leaves by:

- Allowing diffusion of carbon dioxide into the plant for photosynthesis
  - Allowing diffusion of oxygen out of the plant
- Guard cells are used to open and close the stomata.



### Key terms

cuticle epidermis flaccid mesophyll stomata phloem xylem  
turgid translocation transpiration guard cell

### Transportation in plants

| Transpiration  |  | Translocation  |  |
|--|--|--|--|
| <p>Water is lost through the stomata by evaporation. This pulls water up from the roots through the xylem and is called transpiration.<br/>The constant movement of water up the plant is called the transpiration stream.</p> |  | <p>The movement of dissolved sugars from the leaves to the rest of the plant through the phloem.</p>   |  |
| <p>Provides water to cells to keep them turgid.<br/>Provides water to cells for photosynthesis<br/>Transports mineral ions to leaves.</p>  |  | <p>Moves dissolved sugars made during photosynthesis to other parts of the plant. This allows for respiration, growth and glucose storage.</p> |  |
|  |  |  |  |

### Factors affecting the rate of transpiration

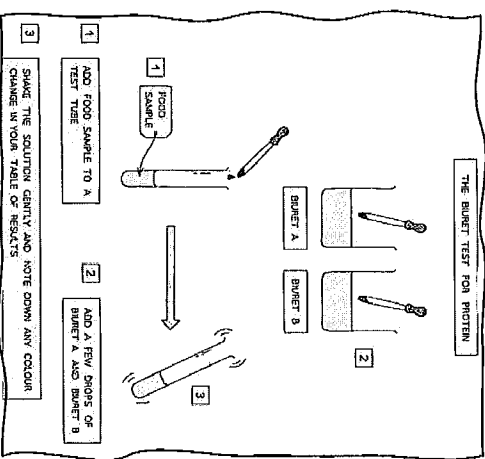
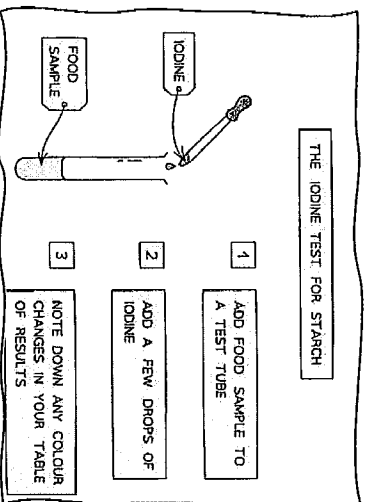
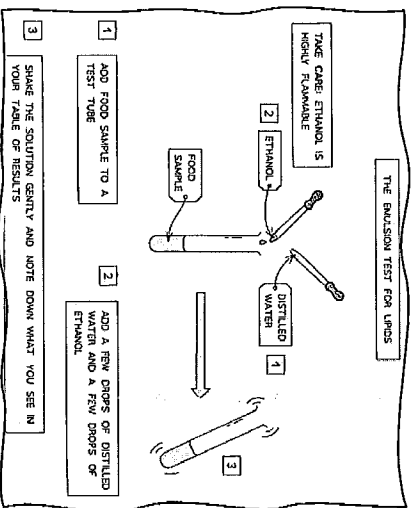
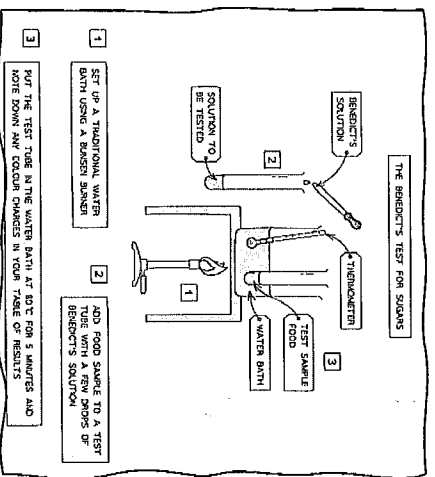
| Factor          | Effect on transpiration                                    | Because...   |
|-----------------|--|--|
| temperature     | higher temperatures increase the rate of transpiration     | water evaporates faster at higher temperatures   |
| humidity        | lower humidity increases the rate of transpiration         | the drier the air the steeper the concentration gradient of water molecules between the air and the leaf |
| wind speed      | more wind increases the rate of transpiration              | wind removes the water vapour quickly, maintaining a steeper concentration gradient                      |
| light intensity | Higher light intensity increases the rate of transpiration | stomata open wider to let more carbon dioxide into the leaf for photosynthesis                           |



# Cells and Organisation 2B

## Knowledge Organiser

### Testing Foods

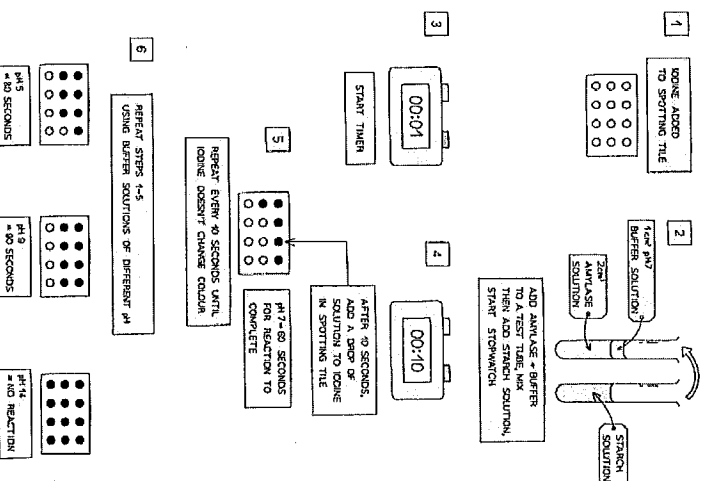


| Food test            | Colour of reagent | Positive test result | Negative test result     |
|----------------------|-------------------|----------------------|--------------------------|
| Iodine for starch    | orange-brown      | blue-black           | orange-brown (no change) |
| Benedict's for sugar | light blue        | green to brick-red   | light blue (no change)   |
| Ethanol for lipid    | colourless        | cloudy emulsion      | colourless (no change)   |
| Biuret for protein   | blue              | lilac-purple         | blue (no change)         |

### Investigating Enzymes

#### Method

- Place single drops of iodine solution in rows on the tile
- Label a test tube with the pH to be tested
- Use the syringe to place 2cm<sup>3</sup> of amylase in the test tube
- Add 1cm<sup>3</sup> of buffer solution to the test tube using a syringe
- Use another test tube to add 2cm<sup>3</sup> of starch solution to the amylase and buffer solution, start the stopwatch whilst mixing using a pipette
- After 10 seconds, use a pipette to place one drop of the mixture on the first drop of iodine, which should turn blue-black
- Wait another 10 seconds and place another drop of the mixture on the second drop of iodine
- Repeat every 10 seconds until iodine solution remains orange-brown
- Repeat experiment at different pH values - the less time the iodine solution takes to remain orange-brown, the quicker all the starch has been digested and so the better the enzyme works at that pH





# Pure and impure substances

## Knowledge Organiser

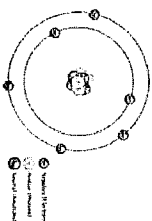
### Atoms

All substances are made of atoms. An atom is the smallest part of an element that can exist.

Atoms are very small, having a radius of about  $1 \times 10^{-10}\text{m}$ . The radius of the nucleus is less than  $1/10000$  of that of the atom.

In an atom, the number of electrons is equal to the number of protons in the nucleus. Atoms have no overall electric charge.

| Particle | Relative Mass | Relative Charge |
|----------|---------------|-----------------|
| Proton   | 1             | +1              |
| Neutron  | 1             | 0               |
| Electron | Very small    | -1              |



### Atomic Number and Mass Number

The number of protons in an atom of an element is its **atomic number**. All atoms of a particular element have the same number of protons. The sum of the protons and neutrons in an atom is its **mass number**.

### Electronic structure

The electrons in an atom occupy the lowest available energy level. The electronic structure can be represented by numbers or by a diagram. For example, the electronic structure of carbon (above) is 2,4.

### Elements, compounds and mixtures

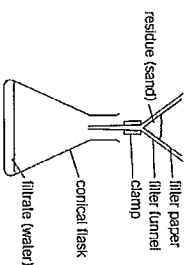
**Elements** are substances that only contain one type of atom. These are represented by chemical symbols, e.g. O represents oxygen. There are about 100 different elements on the periodic table.

**Compounds** are formed when two or more different elements chemically bond together, in fixed proportions. Compounds can only be separated by **chemical reactions**.

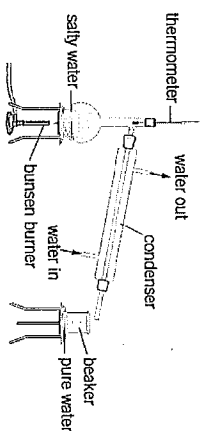
**Mixtures** consist of two or more elements or compounds **not** chemically combined together. **Mixtures** can be separated by **physical processes**.

### Separating techniques

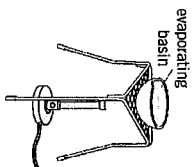
#### Filtration



#### Distillation



#### Evaporation



### Development of the atomic model

| Scientist         | Period | Discovery  | Model |
|-------------------|--------|--|-------|
| John Dalton       | 1808   | Atoms described as solid spheres   |       |
| JJ Thomson        | 1897   | Plum Pudding model - the atom is a ball of positive charge with scattered electrons        |       |
| Ernest Rutherford | 1911   | Alpha Scattering - concentrated positive mass in the centre. Atoms are mostly empty space. |       |
| Niels Bohr        | 1913   | Electrons are in shells orbiting the nucleus   |       |
| James Chadwick    | 1932   | Neutrons in the nucleus  |       |

### Key

atom    atomic number    compound    electron    mass number    neutron    nucleus    proton    element



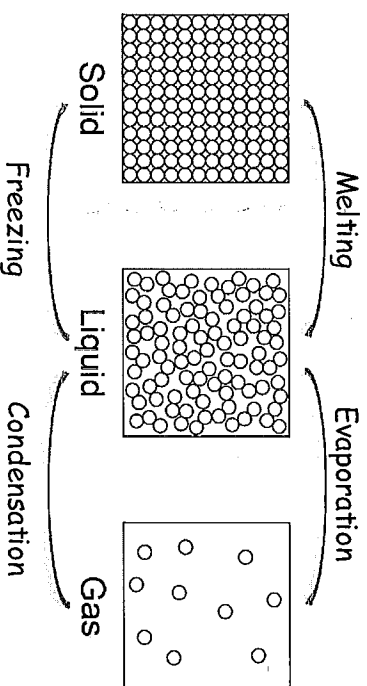


# Pure and impure substances

## Knowledge Organiser

### States of matter

The three states of matter are solid, liquid and gas. They can be represented using the particle model, by small solid spheres.



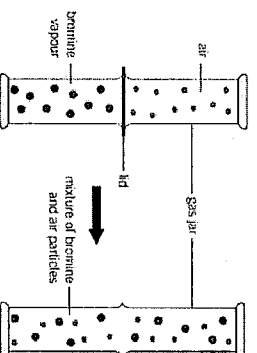
The amount of energy needed to change the state of the substance depends on the strength of the forces between the particles. The stronger the forces between the particles, the higher the melting and boiling point of the substance. There are limitations to this model, due to the following assumptions:

- No forces between the particles
- Particles are all solid spheres

In chemical equations, the three states of matter are shown as (s), (l) and (g), with (aq) for aqueous solutions.

### Diffusion

The particles in fluids are able to move. When they collide, they change direction causing the motion to appear random. Over time, the particles spread out from a region where there are many particles to a region where there are fewer particles. This is called **diffusion**.

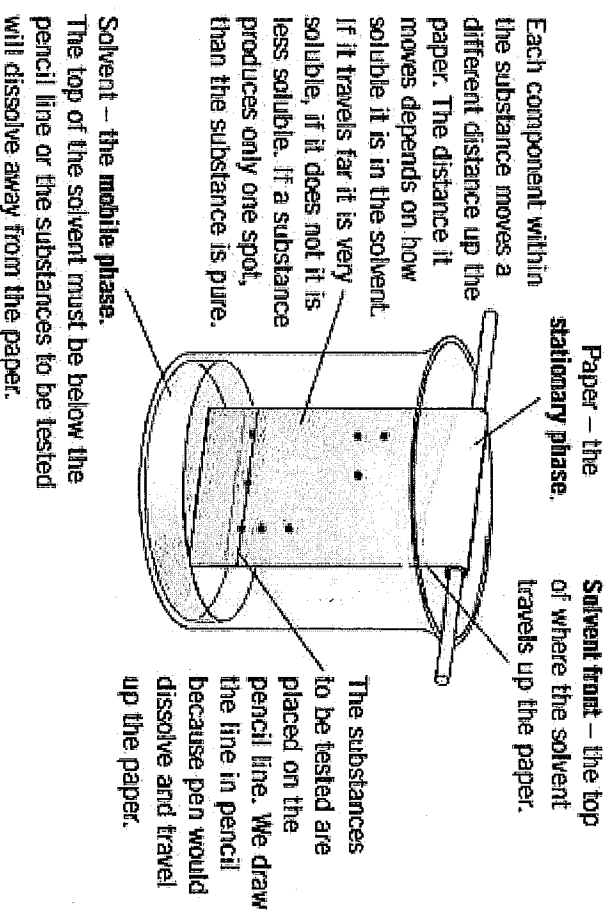


### Chromatography

Chromatography can be used to separate different components in a mixture. Chromatography involves a stationary and a mobile phase. Separation depends on the distribution of substances between the phases. The  $R_f$  value is a ratio of the distance moved by a compound to the distance moved by the solvent.

$$R_f = \frac{\text{Distance moved by substance}}{\text{Distance moved by solvent}}$$

Different compounds have different  $R_f$  values in different solvents and at different temperatures.  $R_f$  values for particular substances can be used to identify a substance.  $R_f$  values are always between 0 and 1.



### Key

Chromatography mobile phase  $R_f$  value solvent stationary phase diffusion high concentration low concentration



# Atoms and periodic table A

## Knowledge Organiser



### Periodic table

In the early 1800s, elements were arranged by **atomic weights**. The periodic table was not complete because some of the elements had not been found and some elements were put in the wrong group.

Dimitri Mendeleev (1869) left gaps in the periodic table to account for elements he thought had not yet been discovered. He put them in order of **atomic number**. Elements with properties predicted were discovered and filled the gaps. The existence of isotopes supported ordering by atomic number.

### Modern Periodic table

The red step shows the divide between metals and non-metals. **Metals** are on the **left** and **non-metals** on the right.

**Groups** are the columns in the periodic table - they go downwards. The group number shows the number of **electrons** in the **outer shell**.

Elements in the same group normally follow the same trends in properties.

**Periods** are the rows in the periodic table - they go sideways. Each **period** shows another full shell of electrons.

| 1  |    | 2  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  | Group number |   |    |    |  |  |  | 0 |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--------------|---|----|----|--|--|--|---|
| 1  | 2  | 3  | 4  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  | 5            | 6 | 7  | He |  |  |  |   |
| H  |    | B  | C  |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  | N            | O | F  | Ne |  |  |  |   |
| Li | Be | Al | Si |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  | P            | S | Cl | Ar |  |  |  |   |
| Na | Mg |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |              |   |    |    |  |  |  |   |
| K  | Ca | Sc | Ti | V  | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga | Ge | As | Se | Br | Kr |  |  |  |  |              |   |    |    |  |  |  |   |
| Rb | Sr | Y  | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In | Sn | Sb | Te | I  | Xe |  |  |  |  |              |   |    |    |  |  |  |   |
| Cs | Ba | La | Hf | Ta | W  | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn |  |  |  |  |              |   |    |    |  |  |  |   |
| Fr | Ra |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |              |   |    |    |  |  |  |   |

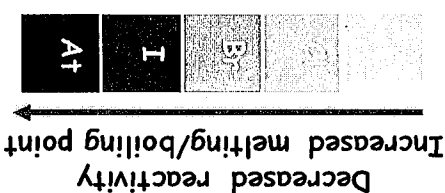
### Group 0 - Noble gases

**Noble gases:** helium, neon and argon are all **non-metals** with **low** melting and boiling points. The boiling points all increase as they go down the group due to greater intermolecular forces. They are colourless gases at room temperature. Group 0 elements are typically unreactive.



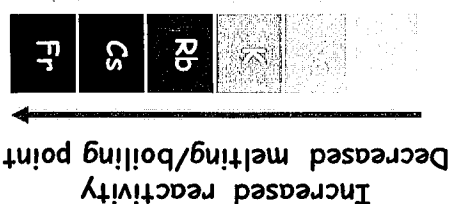
### Group 7 - Halogens

**Halogens:** fluorine, chlorine, bromine and iodine are all **non-metals**. The reactivity **decreases** as they go down the group due to an increase in difficulty gaining an extra electron. The melting and boiling points become higher down the group.



### Group 1 - Alkali metals

**Alkali metals:** lithium, sodium, potassium and rubidium are all soft reactive **metals**. The reactivity **increases** as they go down the group. They get bigger and it is easier for them to lose an electron if it is further from the nucleus. The melting and boiling points become **lower** down the group.



Key

alkali metals

group 1

group 7

group 0

halogen

noble gas

Period

Trend





# Knowledge Organiser: Energy

**Kinetic energy**-Energy of a moving object due to its motion. Joules, J

**Mass**-The quantity of matter in an object. Kilograms, kg

**Elastic potential energy**-Energy stored in an elastic object when work is done to change its shape. Joules, J

**Gravitational potential energy**-The energy of an object due to its position in a gravitational field. Joules, J

**Power**- Energy transferred every second. Watts, W

**Work done**- Energy transferred by a force. Joules, J

**System**- an object or group of objects.

**An open system**- energy is transferred between stores or to the surroundings.

**A closed system**- no energy can escape to or enter from the surroundings.

**Conduction**-The transmission of heat through a solid substance from a region of high temperature to lower temperature.

**Infrared radiation**- Electromagnetic waves in between visible light and microwaves in the electromagnetic spectrum.

**Insulator**- A substance that is a poor conductor of heat and electricity. This is due to a lack of mobile electrons.

**Insulation**- materials that are good insulators and are used to keep you warm (clothes) or thermal energy in your house.

**Non-renewable energy**- it will run out; we are using it at a greater rate than it is produced.

**Renewable energy**- energy from natural sources that is always being replenished so it never runs out.

**Biofuel**- is any fuel taken from a living or recently living organism. Animal waste is an example.

**Nuclear fuel**- substance used in nuclear reactors that releases energy due

| Energy stores           |   |
|-------------------------|---|
| Kinetic                 | Energy an object has because it is moving   |
| Gravitational potential | Energy an object has because of its height above the ground   |
| Elastic potential       | Energy an object has when it is stretched or compressed   |
| Thermal (or internal)   | Energy an object has because of its temperature (the total kinetic and potential energy of the particles in the object) |
| Chemical                | Energy that can be transferred by chemical reactions involving foods, fuels and the chemicals in batteries              |
| Nuclear                 | Energy stored in the nucleus of an atom   |
| Magnetic                | Energy a magnetic object has when it is near a magnet or in a magnetic field  |
| Electrostatic           | Energy a charged object has when it is near another charge object   |

## The law of conservation of energy:

Energy cannot be created, or destroyed-it can only be transferred usefully, stored or dissipated.

### Energy transfers

Energy can be transferred to and from different stores by:

Heating

Energy is transferred from one object to another object with a lower temperature.

Waves

Waves (e.g. light and sound waves) can transfer energy by radiation.

Electricity

When an electric current flows it can transfer energy.

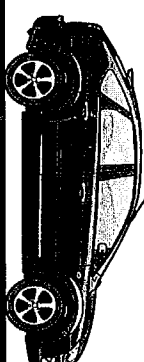
Forces

Energy is transferred when a force moves or

### Kinetic energy:

The kinetic energy of a moving object. The faster it moves the greater the kinetic energy.

kinetic energy, in joules, J



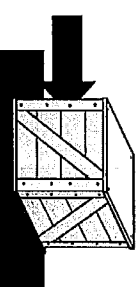
### Gravitational potential energy:

When an object is off the surface of the Earth it has a store of potential energy.



### Work done:

Work done= energy transferred



### Elastic energy:

The amount of energy stored in a stretched or compressed spring or elastic material is called elastic potential energy.



The store of energy in food, batteries, petrol etc.

### Power:

Power is defined as the rate at which energy is transferred or the rate at which work is done. It has the unit W.



### Energy resources:

The main ways we use the Earth's energy resources are:

- Generating electricity
- Heating
- Transport

The energy resources are either renewable or non-renewable.



Non-renewable:

- Coal
- Oil
- Gas
- Nuclear

Renewable:

- Wind turbines
- Biofuel
- Solar panels
- Hydroelectric power station
- Wave
- Tidal
- Geothermal

Non-renewable

Are not replaced as quickly as they are used

Renewable

Will eventually run out

Will not run out

Examples are fossil fuels and nuclear fission

Examples are solar, wave, wind, geothermal, biofuel and hydroelectric.

### Energy resources key information

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

### Heat transfers:

Heat energy or better vocabulary, thermal energy, transfers from hot to cold.

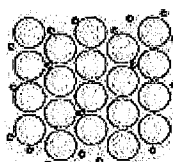
Thermal energy can transfer in 3 ways:

1. Conduction - when a solid is heated, the particles vibrate and collide more. Energy is transferred.



Metals

- Free / delocalised electrons
- Increase kinetic energy
- Collisions
- Heat/ thermal energy transferred



2. Convection - in a fluid (liquid or gas).

3. Radiation - Infrared radiation is how thermal energy transfers as a wave. This can happen in a vacuum, an area where there are no particles.

All objects emit (give out) and absorb (take in) IR. The higher the temperature of the object the more IR it emits. A good absorber of IR is also a good emitter.

Insulation is a way of reducing thermal energy transferring.

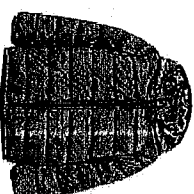
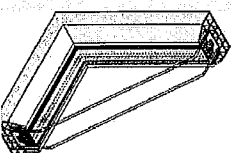
Insulating buildings:

Heating bills are expensive and so it is important to reduce heat loss from buildings.

Some factors that affect the rate of heat loss from a building are:

1. The thickness of its walls and roof
2. The thermal conductivity of its walls and roof
3. Lower thermal conductivity = lower rate of heat loss

The thermal conductivity of the walls and roof can be reduced by using thermal insulators. A material with a low thermal conductivity. The rate of energy transfer through an insulator is low. Your winter coat is another example of an insulator.





## Key vocabulary:

- **Vector**- has magnitude and direction
- **Scalar**- magnitude only
- **Magnitude**- size
- **Displacement**- distance in a direction
- **Newton**- unit of force
- **Driving force** forwards force from an engine
- **Friction**- a force that acts when two surfaces are in contact
- **Resultant force**- a single force with the same effect as all of the forces acting
- **Balanced forces**- forces are the same size and opposite direction
- **Unbalanced forces**- the force on one side is not the same size as the force on the other side
- **Weight**- downwards force when gravity acts on an objects mass
- **Air resistance**- friction between air and another object
- **Stretching force** (tension) a force applied to a string or a rope
- **Gravity**- 9.8N/kg on Earth
- **Moments**- a turning force

## Forces

Forces are everywhere and anywhere that two objects are interacting. Whenever you push, pull, stretch, squash, lift or throw an object, you are exerting a force. Forces can act to change the **speed** of an object, the **direction** it is moving in, or its **shape**.

### Contact forces:

- **Friction**
- **Air resistance**
- **Tension**
- **The normal contact force**

### Non-contact forces:

- **Magnetism**
- **Gravitational force**
- **Electrostatic force**

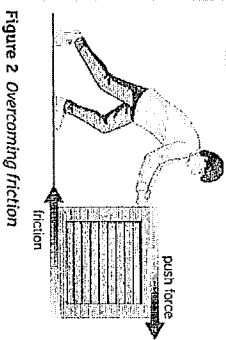
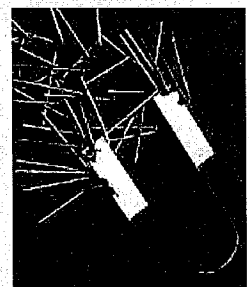
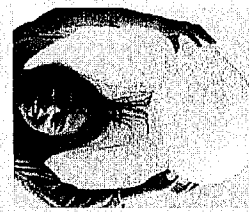
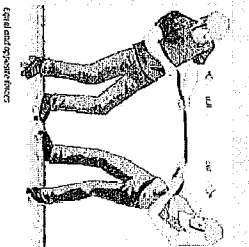


Figure 2 Overcoming friction

## Speed and Velocity

**Speed** is a **scalar** quantity; it is how fast something travels, it has the unit m/s.

**Velocity** is a **vector** quantity. It is speed in a given direction, it has the unit m/s.

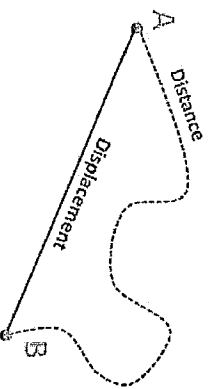
**Distance** is a **scalar** quantity, and it is how far something has travelled and has the unit m.

**Displacement** is a **vector** quantity, and it is distance in a direction. If an object returns to its starting point the displacement is zero.

Speed= distance/ time  
(m/s) (m) (s)

Typical speeds of people:

- walking ~ 1.5 m/s
- running ~ 3 m/s
- cycling ~ 6 m/s



A resultant force is a single force that has the same effect as all the forces acting.

**Balanced forces**- Same size and opposite direction

**Unbalanced forces**- The movement depends on the size and direction of the resultant force.

**Balanced forces, resultant force is zero:**

- objects at rest remains stationary
- object moving keeps moving at a constant speed



**Unbalanced forces:**

- Depends on the size and direction of the resultant force

## Work done

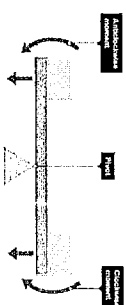
Work is done by a force when an object is moved a distance. Work done is energy transferred and has the unit joules, J.

## Moment

A force or system of forces may cause an object to turn.

A **moment** is the turning effect of a force. Moments act about a point in a clockwise or anticlockwise direction. The point chosen could be any point on the object, but the pivot - also known as the **fulcrum** - is usually chosen.

moment of a force = force  $\times$  distance  
(Nm) (N) (m)



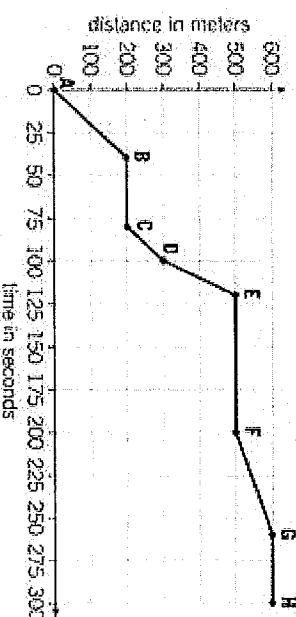
## Distance time graphs

The gradient on a distance time graph represents the speed.

A-B shows **constant speed** as it is a straight line

B-C shows the object is **stationary** as the distance is not changing

C-D is also **constant speed** but as the gradient is **steeper** is a greater constant speed





# Y9 Wonderful Biomes



Key words:

**Biome** - Biomes are areas of our planet with similar climates, landscapes, animals and plants

**Ecosystem** - interaction of the living and non-living parts of an environment- they can be much smaller than a biome.

**Climate** – the average temperature and rainfall

**Characteristics** – the main features of the area

**Fauna** - animals

**Flora / Vegetation** – plants

**Biodiversity** - the range of plants and animals that living in an ecosystem

**Interdependence** – plants and animals needing each other to survive.

**Deforestation** – trees being cut down to use them to sell or use the land left behind; this is usually for the country to make money for their economy

**Soil erosion** – when trees are cut down they no longer hold the soil together, when it rains the soil is washed away

**Extreme environment** – an ecosystem that is very difficult to survive in

**Permafrost** – found in the tundra, it this is the layer of frozen soil under the Earth's surface.

**Inaccessibility** – when it is difficult to reach a location it is not very accessible

## Small Scale Ecosystem

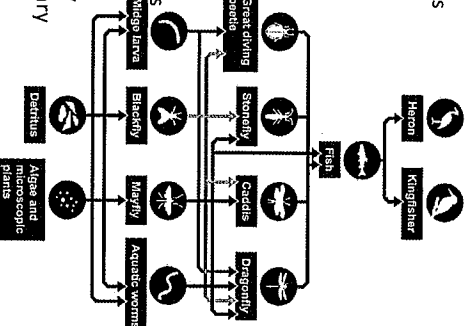
In a small scale ecosystem plants and animals rely on each other to survive.

A food web shows you the complex links of who eats who in an ecosystem.

The producers are always on the bottom (your green plants and algae which provide food to the consumers).

The next level shows your primary consumers (the herbivores which eat the producers).

The final layer (or layers) show the secondary consumers (the carnivores who eat the primary consumers).



## Types of Global Biomes

**Tropical forests** - near the equator, they are hot and humid and contain a huge variety of plants and animals

**Savanna** - hot and dry, lots of grass with some trees. They have a dry season when the vegetation dies, and a rainy season when it grows rapidly

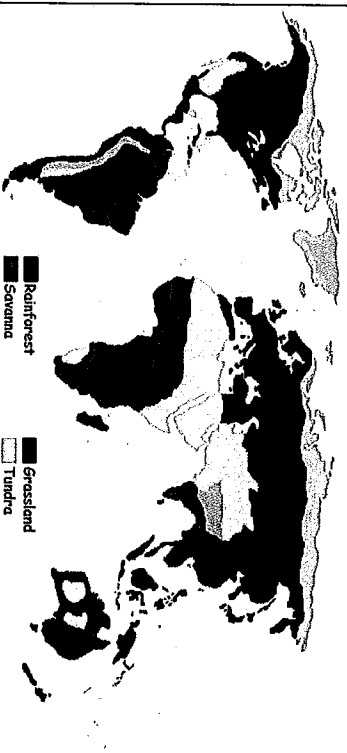
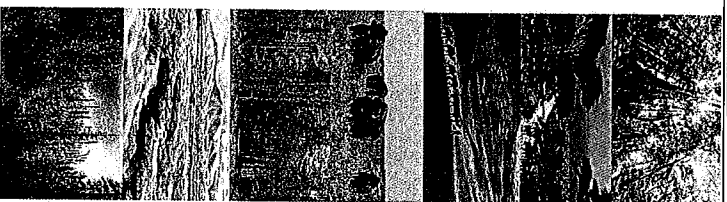
**Desert** - driest and hottest of areas with less than 250mm of rainfall

**Temperate grasslands** - grass and trees and large bushes are rare. Weather is mild with moderate rainfall.

**Temperate deciduous forests** - have trees that lose their leaves and are found across Europe and USA. The weather is mild and wet. They have 4 seasons.

**Tundra** surrounds the North and South poles. They have an extremely cold climate, with limited numbers of plants and animals able to survive there.

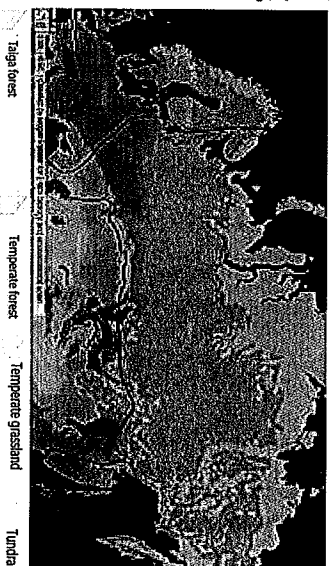
**Taiga Forest** (also known as boreal) evergreen coniferous trees with needles. Summer temperatures rarely rise above 10°C and in the winter, it can be -30°C. Precipitation is low and mainly falls as snow.



## Russia – one country, four Biomes

Russia has more forest cover than any other country in the world, 20% of the world's forest cover is in Russia.

The four main biomes in Russia are Taiga forest, tundra, temperature grasslands and temperate forest



**Taiga**  
Deforestation is a threat to the taiga forest. Russia has the third highest rate of deforestation in the world.

A huge problem is illegal logging in the Taiga, especially in the eastern Siberia areas. This is occurring as there is a high demand from China so they can use the timber for economic development in businesses such as furniture and manufacturing.

**Advantages**  
Creates jobs in Russia which benefits the local economy

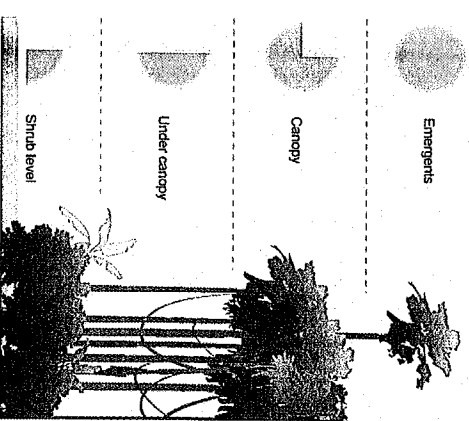


**Disadvantages**  
Leads to nutrients being washed from the soil so it becomes infertile (soil erosion)  
It destroys animal habitats reducing biodiversity (the range of plants and animals) e.g. there are only 450 amur tigers left in the wild



### Tropical Rainforest

Located at 0° - 23.5° North and South of the Equator, tropical rainforests are hot and wet all year round with 12 hours of sunlight per day. The average temperature is 28°C and the annual (yearly) rainfall is 2,100mm



#### Rainforest Adaptations

**Buttress roots** - hold the tree into the ground so it can grow high to get sunlight for photosynthesis in the emergent layer

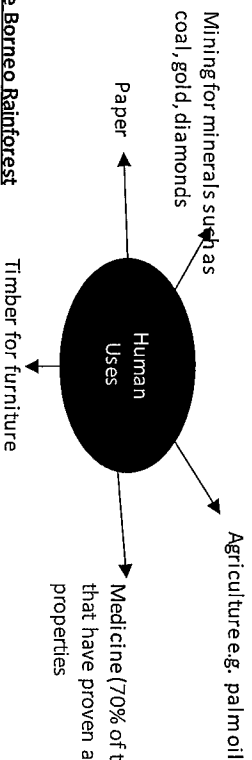
**Drip tips** - water runs off to give water to the plants below in the drier under canopy and does not weigh down the leaf

**Sloth** has long claws to hang onto trees away from predators. It is camouflaged to hide from predators.

**Toucan** has a hooked pointed beak to teach fruit in the tree. It changes its blood flow to help it cool down.



### Human Uses / Threats to the Tropical Rainforest



| Threat   | Positives   | Negatives   |
|--|---|---|
| <b>Agriculture</b> - palm oil production       | Creates jobs for locals, generates tax for the government which can improve development | Trees are removed and burnt resulting in CO2 emissions. Fewer trees cause soil erosion.                       |
| <b>Hunting</b> - e.g. pangolins and orangutans | None  | Reduces biodiversity and will result in changes to the food web. The animals are at risk of becoming extinct. |
| <b>Mining</b> for coal                         | Creates jobs for the economy and coal can be exported to improve their GNI              | Large areas of forest cleared, pollutants from the mine can contaminate local rivers                          |

### Tundra

**Climate:** cold, windy and little rainfall. Snow covers the ground for much of the year. Average temperature -12°C to -6°C. The summer season lasts for 50-60 days and in the summer the permafrost melts. Permafrost is the top layer of frozen soil.

**Animal adaptations:** Arctic Fox - flat snout to dig through the snow, extra blood flow to their feet to keep them warm on the ice

**Plant Adaptations:** Bearberry Plant - low growing to avoid the cold wind, hairy stem to help it keep warm, thick bark to stop it breaking in the strong wind



#### Svalbard Opportunities

1. There are 300 people employed in fishing
2. 70,000 people visit Svalbard providing 300 jobs to local people. They come to visit the glaciers, fjords and polar bears
3. There are mines for coal which currently generate energy through coal powered fire stations but it is hoped this will switch to geothermal energy

#### Svalbard Challenges

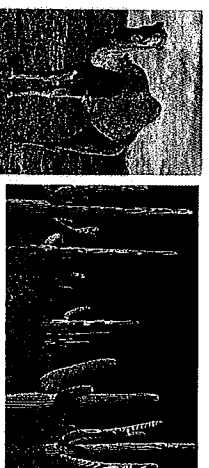
1. Temperatures can reach -30°C, people have to dress very warmly and it makes outdoor activities difficult
2. Svalbard is very remote making trade difficult
3. The permafrost makes building difficult and pipes have to be deep below to permafrost to they do not freeze

### Deserts

**Climate:** Deserts are very arid (dry). They get less than 250mm of rainfall annually (per year) and the average temperature is 36°C

**Animal adaptations:** Camel - stores fat in hump so they can go for longer periods without food or water, long eye lashes to protect from sand storms, wide leathery feet to protect them from the hot sand.

**Plant Adaptations:** Cactus - needles stop predators from eating it, needles help to catch moisture from the air, wide base stores water



#### Mojave Desert Opportunities

1. Tourism - 32 million visitors to Las Vegas each year, provides 20% of their income
2. Mining - for uranium in the Grand Canyon which can be exported
3. Renewable Energy - solar farm provides power for 140,000 homes in Nevada
4. Farming - Irrigation and the Hoover Dam have allowed vineyards which grow grapes for wine in the Coachella Valley

#### Mojave Desert Challenges

1. Temperatures can reach 49°C in the summer making it hard for people to work. Tourists are less likely to visit in the summer leading to seasonal employment
2. There is less than 50mm of rainfall per year making farming challenging; thanks to the Hoover Dam this has been possible.



### Links

[https://www.ted.com/talks/camille\\_a\\_brown\\_a\\_visual\\_history\\_of\\_social\\_dance\\_in\\_25\\_moves](https://www.ted.com/talks/camille_a_brown_a_visual_history_of_social_dance_in_25_moves)  
<http://history-is-made-at-night.blogspot.com/2013/06/saturday-night-dancing-in-1950s-london.html>

### Vocabulary

|                    |   |
|--------------------|---|
| accumulation:      | A choreographic device or structure where new movements are added to existing movements in a successive manner, for example, A, AB, ABC, ABCD.  |
| canon:             | A passage, movement sequence or piece of music in which the parts are done in succession, overlapping one another. E.g. sequential canon.<br>1234<br>- 1234<br>-- 1234<br>--- 1234      |
| dance phrase:      | Part of a larger dance idea. It is composed of a series of connecting movements; similar to a sentence in the written form. It contains a beginning, a middle, an end and a high point. |
| dance sequence:    | Order in which a series of phrased movements and shape occurs.  |
| dynamics:          | Energy of movement expressed in varying intensities, accent and quality.  |
| facing:            | Where a dancer faces when performing each action, e.g. downstage, out to the audience, towards another dancer or body part.   |
| formation:         | A group formation is the pattern or shape that dancers make as a group, e.g. a circle, triangle, lines.   |
| gesture:           | Movement of a body part or combination of parts, with emphasis on its expressive characteristics, including movements of the body not supporting weight.                                |
| improvisation:     | Movement created spontaneously; can be freeform or highly structured environments, always including an element of chance.   |
| isolated movement: | Movement executed with one body part or a small part of the body. Examples include rolling the head, shrugging the shoulders and rotating the pelvis.                                   |
| mirroring:         | Reflecting the movements of another person as if they are a mirror image (facing each other).   |
| unison:            | Identical dance movement that takes place at the same time in a group.  |

## Historical Context and Information

### What is Social Dance?



Social dances are generally intended for participation, which means doing, rather than watching a performance. They are the dances you join in with when you are socialising for entertainment. In the 20th century, there also include ballroom dances, sea dances and line dances, as well as anything you would do down at the disco.

Social dances are not created by any one person but evolve gradually. They are a form of self-expression, as well as a way to build a sense of community.

### Social Dance in the 1950s

After the Second World War, many styles of social dance were created by teens in dancehalls and nightclubs. The styles of dance were based on earlier swing dance styles, but with regional differences. People became enthusiastic dancers with the rise of television music and dance shows, especially in America, and the emergence of Rock and Roll music. The television show *American Bandstand*, hosted by Dick Clark, was a major influence on teen dancers of the time (see a clip here: <https://youtu.be/xISGymht1Q>). Ballroom dance styles evolved during this decade, with the Jive becoming more popular, the Mambo, the Cha Cha and the Meringue developing into the styles we still use today.

### Social Dance in the 1960s

The 1960s had a tendency to develop 'fads'; fashions that rose to popularity quite quickly due to the rise of the television. Young people would see movements or dance being performed to a particular track of music and hence was born 'the next new thing'. These dance styles, such as the Twist and The Madison, which was danced to Ray Bryant's 'Madison Time', were 'here today and gone tomorrow'.

Bob Fosse, an American dancer, actor, film director, screenwriter and choreographer, choreographed his first musical, *The Pajama Game* in 1964, following it with three decades of Broadway and motion picture successes including *Sweet Charity*, *Cabaret* and *All That Jazz*.

His distinct style, characterized by use of the pelvis, rounded shoulders, and arm and hand isolations, is considered a classic theatrical jazz form. These movements included the use of turned-in knee, sideways shuffling, rolled shoulders, and jazz hands. With Fred Astaire as an influence, he used props such as bowler hats, canes and chairs and choreographed the musical dance numbers in films such as *'Sweet Charity'*. It is these types of movements that we now also associate with 1960's social dance thanks to films like *'Austin Powers'* that parody Fosse's style.



### Social Dance in the 1970s

Music had moved on and fads were still strong with fashion becoming more of a form of self-expression and political expression. The '70s were a period of major political and cultural shift, with dance and music defining this decade's youth culture. Dancing became even more important to this new generation of club-goers as more discotheques began to spring up in towns and cities. Known for loud polyester clothing, platform shoes and, of course, disco music, this era of free love and flower power helped fuel some of the wildest dance crazes ever.

In 1975, singer Van McCoy got everyone on the dance floor to 'Do The Hustle' this dance as a mixture of Swing and Latin, performed to a '70s disco beat. Other dance styles included The Bump where partners stepped or swayed to the music and came together to bump hips, the YMCA by The Village People, in 1978 where the dancers simply move their arms to form the letters Y, M, C, and A and the The Funky Chicken where dancers imitated the jerky movements of a chicken.



### Social Dance in the 1980s

The '80s brought us all kinds of cool stuff, like MTV, big hair, Pac Man and great music on the radio and in the clubs. As well as not-as-cool things, like shoulder pads, t-shirts with butt jackets, bawling jumpers, bubble gums and crazy yellow highlights. Some of the biggest dances from the 80's included the Robot, Moon Walking, The Running Man, The MC Hammer Dance, The Macarena, The Sprinkler, Kiss Kiss Jump Dance and The Worm.

The '80s also saw the creation of Break Dance, which is a style of acrobatic street dance, often also called breaking, b-boying or b-girling. Part of Hip-Hop culture, it can often be performed to rap music in the streets. Originating in the late 1970s, Break Dance really came into its own in 1980s with the development of a series of underpinning steps, including the Toprock, the Downrock and other whimsical power moves like head spins, tumbling and freezes. This dance craze was performed in urban environments, often on L.A. bus offs, accompanied by a large music box and a sense of competition.

Ask a child of the 1980s this time. The answer: Hammer Time.



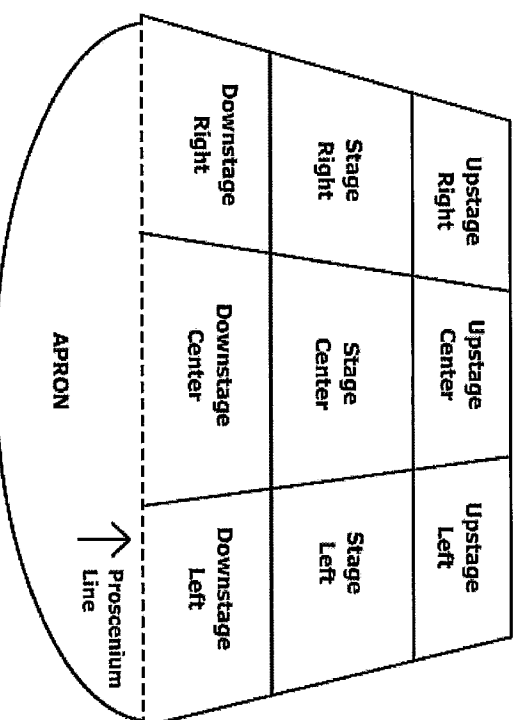


# Year 9, Term 1

## Mastering Stage Craft

### Stage Positions

Here are the names of the areas of the stage that we use in drama.



### Approaching a piece of script

**Who is the character?** - What type of person are they? What happens to them in the production and does this change them in any way?

**Vocal skills** – How am I going to become the character vocally?

**Physicality** – How am I going to become the character physically in the way I sit/stand/move?

**Relationships** – What is my character's relationships to other people in the production and how am I going to show this?

### Stock Characters in Pantomime

**Hero** – The character who saves the day.

**Villain** – An evil character in the story.

**Dame** – A female character played by a man in drag.

**Damsel** – A lady in need of rescuing.

**Sidekick** – A best friend to the damsel OR the villain.

### Stage Configuration

### Key Features

#### Proscenium Arch

Usually used in larger theatres where the audience are all facing the stage which is framed by the arch. The area that is in front of the curtain is called the apron. Larger pieces of scenery/set can be stored in the flies or wings.

#### End On

End on staging has a similar lay out to proscenium arch where the audience are all on one side facing the stage except there is no frame around the stage.

#### Traverse

The stage is a narrow walkway with the audience on 2 sides. There is small acting areas at each end where larger pieces of scenery can be used.

#### Thrust

The stage is in a 'T' shape with the audience on 3 sides. Large pieces of scenery can be used on one end but not in the main performance space.

#### Theatre in the Round

The stage is in the centre of the room with the audience on all 4 sides. This can mean that the audience are closer to the action and feel more included. It can cause some issues for blocking of scenes and use of larger pieces of scenery and props.

#### Promenade

The audience move around the space following the action as the performance takes place. This can create a fully immersive performance but can be a problem for audience to be stood/move around the space.



# Python Knowledge Organiser

## Key Words

|               |   |
|---------------|---|
| Syntax        | The rules of grammar used in a coding language.   |
| Indentation   | A standard used to signify the start and end of a block of code.  |
| Function      | A block of code that performs an action and, once defined, can be reused.   |
| Variable      | An identifier for a memory location, used to store data or is assigned a value that can be changed while the program is running.                    |
| String        | Data type used to store a string of characters.   |
| Integer       | Data type used to store whole numbers.  |
| Float/Real    | Data type used to store decimal numbers.  |
| Boolean       | Data type used to store yes/no, true/false values.  |
| Casting       | Define or change a variables data type.   |
| Concatenating | Joining character strings end-to-end.   |
| Selection     | A programming construct. An option of statements (blocks of code) are provided and different code is executed dependent upon a condition being met. |
| Iteration     | A programming construct. Code is executed/run repeatedly/is looped, until a condition is met/while a condition is true/a set number of times.       |

## Arithmetic

These are used to perform calculations on any number data type.

|   |                |
|---|----------------|
| + | Addition       |
| - | Subtraction    |
| / | Division       |
| * | Multiplication |

Variable

Comparison

```
name = input("What is your name? ")
while name != "Bob":
    print("Where is Bob?")
    name = input("What is your name? ")
    print("Hello Bob")
```

Function

## Python Rules

Never use the shell – You MUST create a new file

You run a program by pressing F5

You save your program every time you run it, so double check you don't save over anything you need!

## Casting

```
- str()      str(animal_name)
- int()      int(goals_scored)
- float()    float(share_price)
```

## Selection

```
if elif else
```

Remember you can only use If and ELSE once when using selection!

## Iteration

```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
    print(x)
```

This code prints each fruit in a fruit list.

## Operators

### Comparison

These are used to compare values on any number data type.

|    |                          |
|----|--------------------------|
| == | Equal to                 |
| >  | Greater than             |
| <  | less than                |
| != | Not equal to             |
| >= | Greater than or equal to |
| <= | less than or equal to    |

While loops are condition controlled.

For loops are count controlled.

```
i = 1
while i < 6:
    print(i)
    i += 1
```

This code prints i as long as i is less than 6.

## Data Types

Integer e.g. 23  
Float/Real e.g. 23.7  
String e.g. Hello all!  
Boolean e.g. TRUE or FALSE



# Year 9 Foundation Topic 1 Calculations Student Knowledge Organiser

## Key words and definitions

A **factor** is a number that divides into another number exactly and without leaving a remainder.

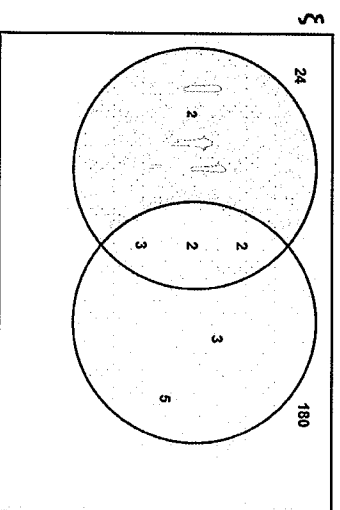
A **prime number** has only two factors - the number itself and 1.

1 is not a prime number

A **Multiple** is the result of multiplying a number by an integer. The times tables of a number.

## HCF & LCM from Venn diagrams

Put each prime factor in the correct place in the Venn diagram. Any common factors should be placed in the intersection of the two circles.

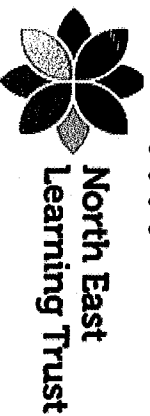


The highest common factor is found by multiplying together the numbers in the intersection of the two circles.

$$\text{HCF} = 2 \times 2 \times 3 = 12$$

The LCM is found by multiplying together the numbers from all three sections of the circles.

$$\text{LCM} = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$$



## Rounding to Significant Figures

### Examples

Round 53,879 to 1 significant figure, then 2 significant figures.

5 | 3879 to 1 significant figure is 50,000

53 | 879 to 2 significant figures is 54,000

Notice that the number of significant figures in the question is the maximum number of non-zero digits in your answer.

Round 0.005089 to 1 significant figure, then 2 significant figures.

0.005 | 089 to 1 significant figure is 0.005

0.0050 | 89 to 2 significant figures is 0.0051

## Highest Common Factor (HCF) and Lowest Common Multiple (LCM)

### HCF Example

Consider the numbers 12 and 15:

The factors of 12 are : 1, 2, 3, 4, 6, 12.

The factors of 15 are : 1, 3, 5, 15.

1 and 3 are the only common factors (numbers which are factors of both 12 and 15).

Therefore, the highest common factor of 12 and 15 is 3.

### LCM Example

Consider the numbers 12 and 15 again:

The multiples of 12 are : 12, 24, 36, 48, 60, 72, 84, ....

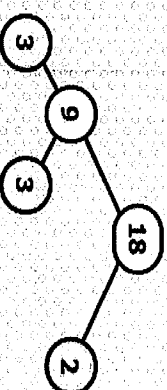
The multiples of 15 are : 15, 30, 45, 60, 75, 90, ....

60 is a common multiple (a multiple of both 12 and 15), and there are no lower common multiples.

Therefore, the lowest common multiple of 12 and 15 is 60.

## 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'.



$$18 = 2 \times 3 \times 3$$

## Error Intervals

An error interval is the range of values that a number could have taken before being rounded or truncated. Error intervals are usually written as a range using inequalities, with a lower bound and an upper bound.

Write down the error interval for y.

$$\begin{aligned} 4.13 \quad 240 \quad 0.01 \quad 0.005 \rightarrow 4.135 \\ 0.005 \rightarrow 4.125 \\ 4.125 \leq y < 4.135 \end{aligned}$$

## Hegarty Maths Links

Error Intervals: 74-77

Rounding to Significant Figures: 130

HCF: 31-32

LCM: 34-36

Product of Prime Factors: 29-30



# Year 9 Foundation Topic 2 Indices and Standard Form Student Knowledge Organiser

## Key words and definitions

**Index number** - number that is multiplied by itself one or more times is raised to a power. The power is the index number. The plural is indices.

**Power** - A number that is multiplied by itself one or more times is raised to a power

**Standard Form** - Writing large and small numbers as a number between 1 and 10 multiplied by a power of 10

**Square Root** - square root of a number is a value that, when multiplied by itself, gives the number

## Powers/Indices

$2^4$  is a short way of writing  $2 \times 2 \times 2 \times 2$ .

## Index laws

1.  $a^m a^n = a^{m+n}$

2.  $\frac{a^m}{a^n} = a^{m-n}$

3.  $(a^m)^n = a^{mn}$

4.  $(ab)^m = a^m b^m$

5.  $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

6.  $a^0 = 1$

7.  $a^{-n} = \frac{1}{a^n}$

e.g.  $b^5 \times b^3 = b^{5+3} = b^8$

e.g.  $(a^2)^5 = a^{2 \times 5} = a^{10}$

## Standard Form

Standard form, or standard index form, is a system of writing numbers which can be very large or very small numbers. It is based on using powers of 10.

Convert to

50,000 can be written as:  $5 \times 10,000$

$10,000 = 10 \times 10 \times 10 \times 10 = 10^4$

So,  $50,000 = 5 \times 10^4$

0.0005 can be written as  $5 \times 0.0001$ .

$0.0001 = 10^{-4}$

So,  $0.0005 = 5 \times 10^{-4}$ .

Convert from

$1.34 \times 10^3$  is 1,340, since  $1.34 \times 10 \times 10 \times 10 = 1,340$ .

$4.78 \times 10^{-3}$  is 0.00478, as  $4.78 \times 0.001 = 0.00478$ .

## BIDMAS

Mathematical operations must be carried out in the correct order. BIDMAS is a way of remembering this order.

B - Brackets

I - Indices/Powers

D - Division

M - Multiplication

A - Addition

S - Subtraction

e.g.  $2 \times 5 - 6 \div 3$

1. There are no brackets (B), so calculate the indices first (I), giving

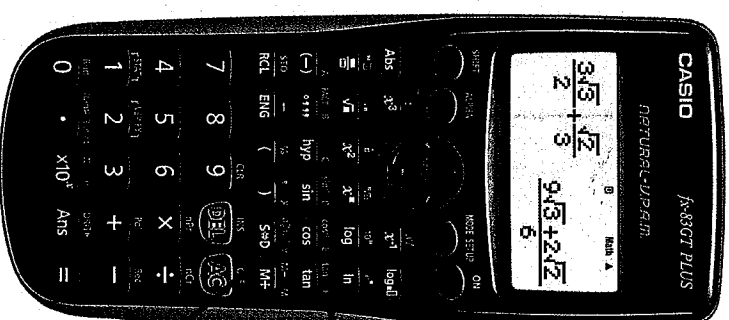
$4 \times 5 - 6 \div 3$

2. Do any divisions or multiplications (DM), working left to right:

$4 \times 5 = 20$  and  $6 \div 3 = 2$

3. And, finally, do any additions or subtractions (AS):  $20 - 2$  gives 18

## Calculator Methods



Calculate

$\sqrt{678 - 1.42^2}$   
 $34 \times 1.57$

1. Press fraction button (use arrow keys to move around the fraction)
2. Press square root button and fill in 678, use arrow key to go out of the square root
3. Subtract 1.42<sup>2</sup>
4. Move down the fraction and press the indices button and use the arrow keys to fill in the numbers and multiply by 1.57

## Hegarty Maths Links

Powers and roots - 99 to 110

Standard Form - 121 to 128

Order of calculation - 24



# Year 9 Foundation Topic 3 Expressions Student Knowledge Organiser

Key words and definitions

**Substitution:** putting numbers where the letters are

**Simplify:** make an algebraic expression easily understandable and solvable

**Expand:** multiply to remove the ( )

**Factorise:** putting an expression back into brackets.

Substitution

$$2b^2c = 2 \times b^2 \times c$$

(substituting  $b = 4$   $c = 3$ )

$$\text{This gives: } 2b^2c = 2 \times b^2 \times c = 2 \times 4^2 \times 3$$

$$2 \times 16 \times 3 = 96$$



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Simplify

Simplify  $b + b + b + b$ .

Adding the four like terms together gives  $4b$ .

$$\text{Simplify } 5m + 3m - 2m. = 8m - 2m = 6m$$

Expand (Single Brackets)

To remove brackets, multiply the term on the outside of the bracket with each term inside the brackets.

Expand and simplify:

$$\begin{aligned} 3(x + y) + 2(x + y) &= 3x + 3y + 2x + 2y \\ &= 5x + 5y \end{aligned}$$

Simplify (with multiplication and division)

Simplify  $b \times b \times b$ .

$$b \times b \times b = b^3.$$

When you divide powers you subtract them (shown below):

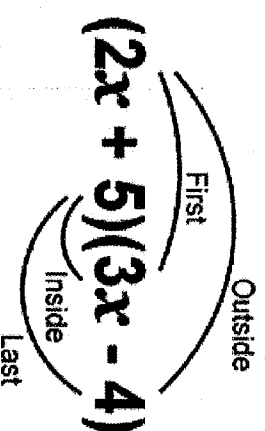
Simplify  $16e^2 \div 2e$ .

$$\frac{a^5}{a^2} = a^{5-2} = a^3$$

$$\begin{aligned} 16 \div 2 &= 8 \text{ and } e^2 \div e = e. \\ 16e^2 \div 2e &\text{ simplified is } 8e. \end{aligned}$$

Expand (Double Brackets)

Expand and Simplify  $(2x + 5)(3x - 4)$



$$(2x + 5)(3x - 4)$$

$$= (2x \times 3x) + (2x \times -4) + (5 \times 3x) + (5 \times -4)$$

$$= 6x^2 - 8x + 15x - 20$$

$$= 6x^2 + 7x - 20$$

Hegarty Maths Links

Expressions: Video 154

Substitution: Videos 155, 780-789

Expansion: Videos 160-166

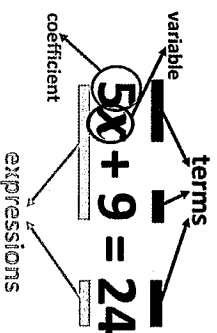
Simplify: Videos 170-171



# Year 9 Foundation Topic 4 Equations Student Knowledge Organiser

## Key words and definitions

- Variable – A symbol for an unknown value. Usually a letter, such as  $a$ ,  $x$  or  $y$
- Constant – A number on its own
- Coefficient – A number that is multiplied by a variable e.g.  $8y \rightarrow 8$  is the coefficient and  $y$  is the variable
- Term – Either a single number, a variable, or number and/or variables multiplied together
- Expression – A term or a combination of terms
- Equation – A mathematical sentence starting that two expressions are equal



## Solving Linear Equations

- Solve the equation  $4y + 5 = -3$ .
- $4y + 5 = -3$
- Subtract 5 from each side:
- $4y + 5 - 5 = -3 - 5$
- Simplify:
- $4y = -8$
- Get  $y$  by itself by dividing both sides by 4:
- $4y \div 4 = -8 \div 4$
- $y = -2$



## Rearranging Formulae

The **subject** of a formula is the variable that is being worked out. It can be recognised as the letter on its own on one side of the equals sign.

For example, in the formula for the area of a rectangle  $A = bh$  ( $\text{area} = \text{base} \times \text{height}$ ), the subject of the formula is  $A$ .

Rearrange the formula  $v = u + at$  to make  $t$  the subject of the formula.

$$v = u + at$$

$$-u \quad -u$$

$$v - u = at$$

$$\div a \quad \div a$$

$$\frac{v - u}{a} = t$$

The letter  $t$  is now isolated, so  $t$  is now the subject of the formula.

## Inequalities



Writing inequalities on a number line:

- Place dot on the numbers given in the inequality
- Colour in dot if your sign is a greater/less than or equal to
- Draw the line to satisfy the inequality

e.g.

$$x < 2$$

$$-5 \leq x < 4$$

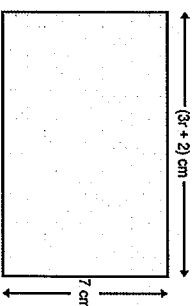


The process to solve inequalities is the same as the process to solve equations.

$$\begin{array}{rcl} 3m + 2 & > & -4 \\ -2 & & -2 \\ 3m & > & -6 \\ \div 3 & & \div 3 \\ m & > & -2 \end{array}$$

## Forming and Solving Equations

The area of this rectangle is  $56 \text{ cm}^2$ . Find the value of  $r$ .



**Area of a rectangle = base  $\times$  height.** This means  $3r + 2$  will all be multiplied by 7. To show this in algebra, use a bracket for  $3r + 2$  to show that both terms are being multiplied by 7.

7 multiplied by  $(3r + 2)$  can be written as  $7(3r + 2)$  as multiplication signs are not used in algebra.

Area = base  $\times$  height

$$\text{Area} = 7(3r + 2)$$

The area of the rectangle has been given in the question as  $56 \text{ cm}^2$ .

$$42 = 21r$$

$$56 - 14 = 21r + 14 - 14$$

Isolate  $21r$  by subtracting 14 from both sides:

$$56 = 7(3r + 2)$$

Expand the bracket:

$$56 = 7 \times 3r + 7 \times 2$$

$$56 = 21r + 14$$

Isolate  $r$  by dividing both sides by 21:

$$42 \div 21 = 21r \div 21$$

$$2 = r$$

## Hegarty Maths Links

- Solving equations 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187
- Forming and solving equations 176, 188
- Rearranging Formulae 280, 281, 282, 283, 284, 285, 286, 287
- Simultaneous Equations 190, 191, 192, 193, 194, 195



# Year 9 Foundation Topic 5 Charts and averages Student Knowledge Organiser

## Key words and definitions

Frequency – How many times a value occurs

Cumulative Frequency – Frequency added together

Ascending – Going up from smallest to biggest

Median – Middle value in an ascending list of data

Mode/Modal value – most common value in the data

Mean - The total of the numbers divided by how many

numbers there are.

Range – Biggest number – smallest number

Sum - addition of values

Averages from lists

7 babies weigh the following amounts:

2.5 kg, 3.1 kg, 3.4 kg, 3.5 kg, 3.5 kg, 4 kg, 4.1 kg

$$\bullet \text{ mean} = \frac{2.5 + 3.1 + 3.4 + 3.5 + 3.5 + 4 + 4.1}{7} = \frac{24.1}{7} = 3.44 \text{ (2 dp)}$$

• 2.5 kg, 3.1 kg, 3.4 kg, 3.5 kg, 3.5 kg, 4 kg, 4.1 kg

The median weight of these babies is 3.5 kg.

• 2.5 kg, 3.1 kg, 3.4 kg, 3.5 kg, 3.5 kg, 4 kg, 4.1 kg

The modal weight is 3.5 kg.

Hegarty Maths Links

Pie charts - 427, 428, 429

Averages – 413, 419, 417, 418, 416, 415, 404, 409, 406

Scatter Graphs – 453, 454

## Averages from table

|       | Number of Goals | Frequency | Cumulative Frequency |
|-------|-----------------|-----------|----------------------|
|       | 0               | 2         | 2                    |
|       | 1               | 3         | 5                    |
|       | 2               | 5         | 10                   |
|       | 3               | 1         | 11                   |
| Total |                 | 11        |                      |

Mode = category with biggest frequency = **2 goals**

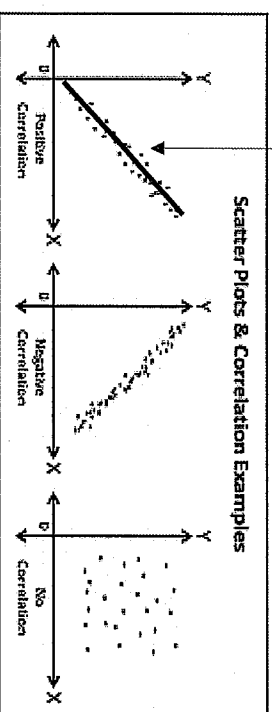
Median = value in the  $\frac{\text{Total}+1}{2}$  position = 6<sup>th</sup> position = **2 goals**

$$\text{Mean} = \frac{\text{Sum of frequency} \times \text{number of goals}}{\text{Total}} = \frac{0 \times 2 + 1 \times 3 + 2 \times 5 + 3 \times 1}{11} = \frac{16}{11} = 1.5 \text{ goals (1.d.p)}$$

For grouped data,  $0 \leq m < 4$  use the middle value when multiplying the data by the frequency when calculating the mean.

## Scatter Graphs

Use a line of best fit to show correlation and to estimate values using the scatter graph



## Reverse mean

The mean height jumped by a high jumper after 10 jumps is 1.81m. He jumps another jump at 1.73m, what is his new mean height?

$$1.81 \times 10 = 18.1\text{m} = \text{Sum of all 10 jumps}$$

$$\text{Mean of 11 jumps} = \frac{\text{Sum of 11 jumps}}{\text{Total no. of jumps}}$$

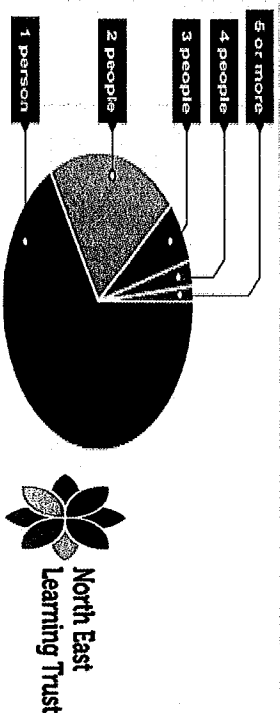
$$= \frac{18.1 + 1.73}{11} = 1.80\text{m (2.d.p)}$$

## Pie Charts

To draw a pie chart, find the proportion of  $360^\circ$  :

$$1 \text{ item/frequency} = \frac{\text{Total Frequency}}{360^\circ} = \frac{360^\circ}{180} = 2^\circ$$

| People travelling in a vehicle | Frequency | Calculation    | Angle       |
|--------------------------------|-----------|----------------|-------------|
| 1 person                       | 120       | $2 \times 120$ | $240^\circ$ |
| 2 people                       | 40        | $2 \times 40$  | $80^\circ$  |
| 3 people                       | 13        | $2 \times 13$  | $24^\circ$  |
| 4 people                       | 5         | $2 \times 5$   | $10^\circ$  |
| 5 or more people               | 2         | $2 \times 2$   | $4^\circ$   |
| Total                          | 180       |                |             |





# Year 9 Higher Topic 1 Factors and Multiples Student Knowledge Organiser

## Key words and definitions

**Factor:** a number that divides into another number exactly and without leaving a remainder.

**Prime number:** A prime number has only two factors - the number itself and 1. 1 is not a prime number

**Multiple:** This is the result of multiplying a number by an integer. The times tables of a number.

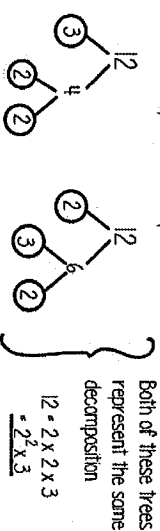
**Product:** the result when terms are multiplied together

**Error Interval:** the range of values a number could have taken before being rounded or truncated

## Product of Prime Factors

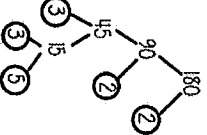
### Example 1

Write 12 as a product of it's prime factors



### Example 2

Write 180 as a product of it's prime factors



$$180 = 2 \times 2 \times 5 \times 3 \times 3$$

$$= 2^2 \times 3^2 \times 5$$

Always try to write your final answer in ascending order using index notation!

### Using prime factor decomposition

If we know that 12 written as a product of it's prime factors, how does that help us to write 36 as a product of it's prime factors?

We know  $12 \times 3 = 36$  therefore we can multiply our answer by three and

$$= 2^2 \times 3^2$$

What about 120?

Well 120 is  $10 \times 12$  so we can say

$$120 = 2 \times 2 \times 3 \times 10$$

$$= 2^2 \times 3 \times 5$$

## Lowest Common Multiple

### Example 1

What is the LCM of 6 and 8?

6 - 6, 12, 18, 24, 30  
8 - 8, 16, 24, 32, 40

The first time their multiples match is 24, therefore:

the LCM of 6 and 8 is 24

### Example 2

What is the LCM of 6 and 8?



The LCM is the product of the prime factors in the Venn diagram. To find the LCM

$$\text{LCM of 6 and 8} = 3 \times 2 \times 2 \times 2 = 24$$

## Highest Common Factor

### Example 1

What is the HCF of 6 and 8?

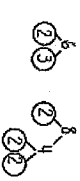
6 - 1, 2, 3, 6  
8 - 1, 2, 4, 8

The biggest number which is a factor of both 6 and 8 is 2, therefore

the HCF of 6 and 8 is 2

### Example 2

What is the HCF of 6 and 8?



As we are looking for the highest common factor, we are looking for the factors which the two numbers share. These can be found in the overlap in the Venn diagram.

HCF of 6 and 8 = 2

## Hegarty Maths Links

Product of Prime Factors: 29-30

HCF: 31-32 and LCM: 34-36

Rounding to Significant Figures: 130

Error Intervals: 774 - 777

Bounds Calculations: 137 - 139

## Rounding - Decimal Places

$$2.46192 \text{ (to 2dp) - is this closer to 2.46 or 2.47}$$

$$2.46192$$

This shows the number is closer to 2.46

## Rounding - Significant figures

370 to 1 significant figure is 400

37 to 1 significant figure is 40

37 to 1 significant figure is 4

0.37 to 1 significant figure is 0.4

0.00000037 to 1 significant figure is 0.0000004

We count significant figures from the first non-zero digit

## Error Intervals

An error interval is a way of representing the upper and lower bounds of a value as an inequality.

Eg: w has been rounded to 6.4cm correct to one decimal place. Lower Bound = 6.35 Upper Bound = 6.45

$$\text{The error interval for w is: } 6.35 \leq w < 6.45$$

## Calculations with Bounds

A = 30 to nearest whole number LB = 29.5 UB = 30.5

B = 11.5 to 1 decimal place LB = 11.45 UB = 11.55

C = 300 to 1 significant figure LB = 250 UB = 350

Calculate the maximum value of A + B

$$\text{UB of A} + \text{UB of B} = 30.5 + 11.55 = 42.05$$

Calculate the minimum value of A x C

$$\text{LB of A} \times \text{LB of B} = 29.5 \times 250 = 7375$$

Calculate the maximum value of C ÷ B

$$\text{UB of C} \div \text{LB of B} = 350 \div 11.45 = 30.57 \text{ (2dp)}$$



# Year 9 Higher Topic 2 Indices and standard form Student Knowledge Organiser

## Key words and definitions

**Base** – The number that gets multiplied by a power  
**Index number** - number that is multiplied by itself one or more times is raised to a power. The power is the index number. The plural is indices.

**Standard Form** – A system used to write both large and small numbers as a number between 1 and 10 multiplied by a power of 10

**Integer** – A whole number

**Reciprocal** – The reciprocal of a number is 1 divided by the number. A number multiplied by its reciprocal will always give an answer of 1.

## Index laws

### Rule

$$a^m \times a^n = a^{m+n} \quad 2^5 \times 2^3 = 2^8$$

$$a^m \div a^n = a^{m-n} \quad 5^7 \div 5^3 = 5^4$$

$$(a^m)^n = a^{m \times n} \quad (10^3)^7 = 10^{21}$$

$$a^1 = a \quad 17^1 = 17$$

$$a^0 = 1 \quad 34^0 = 1$$



## Negative Indices

### Rule

$$a^{-m} = \frac{1}{a^m} \quad a^m \text{ is the reciprocal of } a^m$$

### Examples

$$9^{-2} = \frac{1}{9^2} = \frac{1}{81} \quad \left(\frac{1}{3}\right)^3 = \left(\frac{3}{1}\right)^3 = 27$$

## Fractional Indices

$$a^{\frac{1}{m}} = \sqrt[m]{a}$$

$$a^{\frac{n}{m}} = \left(\sqrt[m]{a}\right)^n$$

$$25^{\frac{1}{2}} = \sqrt{25} = 5$$

$$25^{\frac{3}{2}} = \left(\sqrt{25}\right)^3 = 5^3 = 125$$

$$8^{\frac{1}{3}} = \sqrt[3]{8} = 2$$

$$(8x^2)^{\frac{1}{2}} = \sqrt{8x^2} = 9x$$

## Negative Fractional Indices

$$8^{-\frac{1}{3}} = \frac{1}{8^{\frac{1}{3}}} = \frac{1}{2}$$

$$25^{-\frac{3}{2}} = \frac{1}{25^{\frac{3}{2}}} = \frac{1}{125}$$

Think about what the negative in the power does first.

## Standard Form Conversions

Numbers in standard form should always be written in the following format:

Write 32 000 000 in standard form:  
 $32\,000\,000 = 3.2 \times 10\,000\,000 = 3.2 \times 10^7$

Write  $8.35 \times 10^{-3}$  as an ordinary number:  
 $8.35 \times 10^{-3} = 8.35 \times 0.001 = 0.008\,35$

$$A \times 10^n$$

A is 1 or greater, but less than 10

This power is always an integer

## Standard Form Calculations

### Add and Subtract

$$6 \times 10^5 + 8 \times 10^5$$

$$= (6 + 8) \times 10^5 = 14 \times 10^5$$

$$= 14 \times 10^5 = 14 \times 10^1 \times 10^4 = 1.4 \times 10^6$$

$$\frac{1.5 \times 10^5}{0.3 \times 10^3}$$

For multiplication and division you can look at the values of A and the powers of 10 as separate calculations.

$$\frac{(1.5 \times 10^5) \div (0.3 \times 10^3)}{15 - 0.3} \times 10^5 - 10^3 = 5 \times 10^4$$

## Hegarty Maths Links

- Index Laws: 102-107
- Negative Indices: 104
- Fractional Indices: 108-109
- Standard Form Conversions: 122-124
- Calculations with Standard Form: 125-127



|                      |                          |
|----------------------|--------------------------|
| Factorise $x^2 - 16$ | Factorise $4x^2 - 81y^2$ |
| $= x^2 - 4^2$        | $= (2x)^2 - (9y)^2$      |
| $= (x + 4)(x - 4)$   | $= (2x + 9y)(2x - 9y)$   |



# Year 9 Higher Topic 4 Equations Student Knowledge Organiser

## Key words and definitions

**Equation:** An equation says that two things are equal

**Expression:** Is a set of terms combined using the operations

**Variable:** A symbol (usually a letter) standing in for an unknown value

**Linear:** Linear functions are those whose graph is a straight line

**Subject:** The variable that is being worked out

**Inequality:** Compares two values, showing if one is less than, greater than, or simply not equal to another value

**Integer:** Whole number

$$8b + 5 \neq 29$$

Step 1: Subtract 5 from both sides.

$$8b = 24$$

Step 2: Divide both sides by 8.

$$b = 3$$

$$-3x + (-2) = -17$$

Adding integers

$$-3x + 2 = -15$$

Solve One-Step Equations

Dividing integers

$$-3x = -15$$

$$\div (-3) \div (-3)$$

$$x = 5$$

## Solving Equations using Cross-Multiplication

**Ex1 Solve,**

$$\frac{3x-1}{x+2} = 2$$

Solution

$$\times (x+2)$$

$$3x-1 = 2(x+2)$$

Expand

$$3x-1 = 2x$$

$$-2x$$

$$x-1 = 4$$

$$+1$$

$$x = 5$$

Multiply to remove the denominator.

**Ex3 Solve,**

$$\frac{4x+2}{2x-3} = 10$$

Solution

$$\times (2x-3)$$

$$4x+2 = 10(2x-3)$$

Expand

$$4x+2 = 20x$$

$$-4x$$

$$2 = 16x-30$$

$$+30$$

$$32 = 16x$$

$$\div 16$$

$$2 = x$$

Multiply to remove the denominator.

## Forming Equations

**Perimeter:**

$$x + 2 + x + 2 + x + x = 4x + 4$$

**Area:**

$$x + 2 \times x = x^2 + 2x$$

The sum of  $(x+2)$ ,  $(x+3)$  and  $(x+4)$  is 28.

Work out x.

$$x + 2 + x + 3 + x + 4 = 21$$

$$3x + 9 = 21$$

$$3x = 12$$

$$x = 4$$

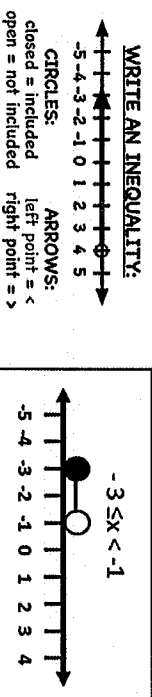
## Inequalities

Greater than  $>$  Greater than or equal to  $\geq$

Less than  $<$  Less than or equal to  $\leq$

Not equal to  $\neq$

## Inequalities on a Number Line



## Solving Inequalities

### Solving Two-Step Inequalities

1. Add or subtract to isolate the variable term.
2. Multiply or divide to solve for the variable. If multiply or divide by a negative number then reverse the inequality symbol.

Example:

$$-3x + 5 \leq -16$$

$$-5$$

$$-5$$

Subtract

$$-3x \leq -21$$

$$\div -3$$

$$\div -3$$

Divide by -3, reverse inequality

$$x \geq 7$$

## Changing the Subject of the Formula

Make  $x$  the subject of this formula  $y = 3x + 5$

$$y = 3x + 5 \quad (-5) \quad (\text{Subtract 5 from both sides})$$

$$y - 5 = 3x \quad \div (3) \quad (\text{Divide both sides by 3})$$

$$\frac{y-5}{3} = x \quad \text{or} \quad x = \frac{y-5}{3}$$

Make  $c$  the subject

$$A = 3b + 3c$$

$$A - 3b = 3c$$

$$\frac{A-3b}{3} = \frac{3c}{3}$$

$$\frac{A-3b}{3} = c$$

Expand

Subtract  $3b$

Divide by 3

Cancel out on the RHS

## Hegarty Maths Links

Solving Linear Equations: 179-186

Forming Equations: 188

Inequalities on a Number Line: 265 & 267

Solving Inequalities: 269-271

Changing the Subject of the Formula: 280 - 286





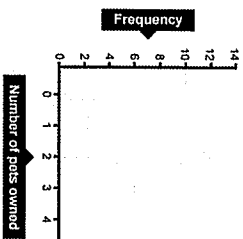
# Year 9 Higher Topic 5 Charts and averages Student Knowledge Organiser

## Key words and definitions

- Qualitative Data: Data which is non numeric
- Quantitative Data: Data which is numeric
- Discrete Data: Continuous Data:
- Mean: A type of average where all the data is added and divided by the amount of data
- Mode: An average which is the most popular piece of data
- Median: An average found when all data is put in order and middle value selected.
- Range: Difference between the largest value and the smallest value

## Bar Chart.

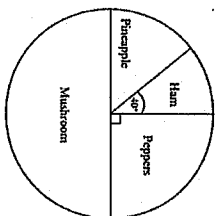
Represents data as vertical blocks. Each bar should be the same width. There should be gaps between each bar. Label each axis



Hegarty Maths Links

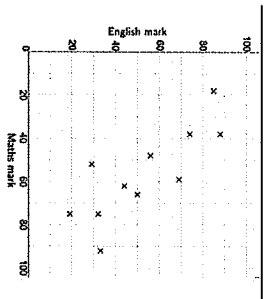
## Pie Chart.

When drawing a pie chart, divide 360 by the total frequency. This will give you how many degrees are required for each part of the data. For example, in a survey of 40 people, if you do 360 divided by 40, it would mean each person would be represented by 9 degrees

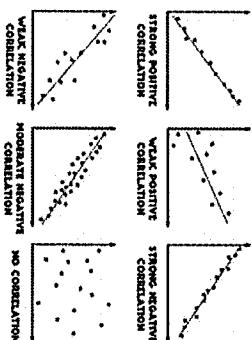


## Scatter Graphs.

A scatter graph is used to plot data measured in two ways. Each point plotted is a single piece of data with two measurements. Eg, each point on the following is for a single pupil, with their Maths and English scores from a test



When the points plotted on a scatter graph are all very close together, we say there is a strong **correlation** between the two things being measured. This might mean the two things are connected



## Averages

Mean - Add up the values and divide by how many values there are.  
The mean of 3, 4, 7, 6, 0, 4, 6 is  $\frac{3+4+7+6+0+4+6}{7} = 5$

Median - The middle value.  
Put the data in order and find the middle one  
Ordered: 2, 3, 4, 5, 6, 7  
Median = 5

Mode - Most frequent/common.  
Range - The difference between the highest and lowest values  
Find the mode: 4, 5, 2, 3, 6, 4, 7, 8, 4  
Mode = 4

Find the range: 3, 31, 26, 102, 37, 97  
Range = 102-3 = 99

## Averages From Tables

You can use frequency tables to work out the Mean, Median, Mode and Range of a set of Data.

| Pets | Frequency |
|------|-----------|
| 0    | 12        |
| 1    | 7         |
| 2    | 11        |

Mode - The mode is the value with the highest frequency - 0  
Median - Divide the total frequency by 2 to work out the middle value.  
 $12+7+11=30$ ,  $30 \div 2=15$   
The first 12 values are 0. The next 7 values (so the 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup> ...) are 1.  
So the median is the 15<sup>th</sup> value, which is 1.  
Mean - Total =  $0 \times 12 + 1 \times 7 + 2 \times 11 = 29$   
Total Frequency = 30  
Mean =  $29 \div 30 = 0.96666...$



# Year 9 Higher Topic 6 Area and volume Knowledge Organiser

## Key words and definitions

**Perimeter:** total distance around the edge of a shape

**Perpendicular:** two straight lines at right-angles to each other

**Radius:** distance from the centre to outer edge of a circle – notation is  $r$

**Diameter:** distance from one side of a circle to the other passing through the centre – notation is  $d$

**Circumference:** total distance around a circle

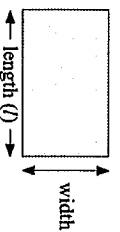
**Arc:** part of the circumference

**Sector:** part of a circle, cut from the centre to the edge (a pizza slice)

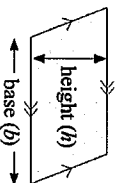
**$\pi$ :** mathematical value used when calculating with circles/curved shapes

**Prism:** 3D shape with constant cross-section through the entire length

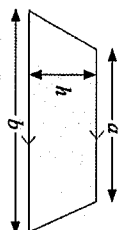
## Area



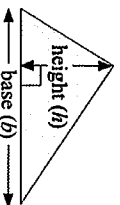
**Area = length  $\times$  width**



**$A = bh$**



**$A = \frac{1}{2}(a + b) \times h$**



**Area =  $\frac{1}{2} \times \text{base} \times \text{perpendicular height}$**

## Hegarty Maths Links

Area: 44, 45, 48, 49

Sine rule: 337

Compound area: 41

Circles: 40, 59, 60

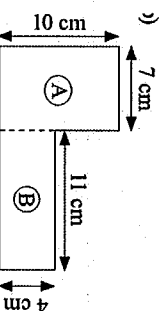
Sectors: 46, 58

Volume: 355 – 358

Surface area: 310 – 312, 315

## Compound shapes – formed by merging multiple shapes

Split the shape up into basic shapes. Find the area of each, then add together.



**Area of rectangle A** =  $10 \times 7$   
=  $70 \text{ cm}^2$

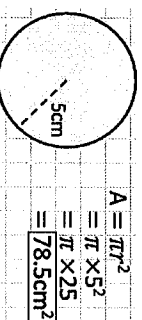
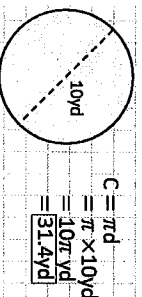
**Area of rectangle B** =  $11 \times 4$   
=  $44 \text{ cm}^2$

**Total area of shape** =  $70 + 44$   
=  $114 \text{ cm}^2$

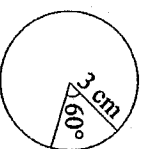
## Circles – Circumference & Area

**$C = \pi d$**

**$A = \pi r^2$**



## Sectors



**Length of arc** =  $\frac{\theta}{360} \times \text{circumference} = \frac{\theta}{360} \times 2\pi r$

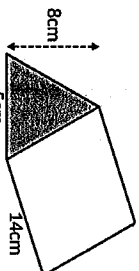
**Area of sector** =  $\frac{\theta}{360} \times \text{area of circle} = \frac{\theta}{360} \times \pi r^2$

**Area of sector** =  $\frac{60}{360} \times \pi \times 10^2 = \frac{1}{6} \times 9\pi = \frac{3}{2}\pi \text{ cm}^2$

**Length of arc** =  $\frac{60}{360} \times (2 \times \pi \times 10) = \frac{1}{6} \times 6\pi = \pi \text{ cm}$

## Volume of Prisms – example shown of triangular prism

**Volume of a prism = area of cross section  $\times$  length of prism**



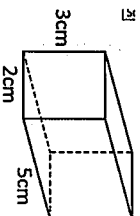
This volume formula works for all prisms. Only the formula for the cross-section area will change dependent on the shape.

**Area of  $\Delta$**  =  $\frac{5 \times 8}{2}$   
=  $20 \text{ cm}^2$

**Volume** =  $20 \text{ cm}^2 \times 14$   
=  $280 \text{ cm}^3$

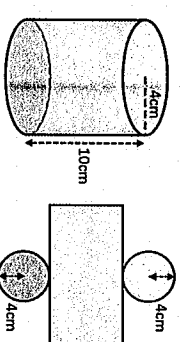
## Surface area of Prisms – examples of cuboid & cylinder

**Surface area of a prism = sum of the areas of all the faces**



Front =  $2 \times 3 = 6$   
Back =  $2 \times 3 = 6$   
Top =  $2 \times 5 = 10$   
Base =  $2 \times 5 = 10$   
Left side =  $3 \times 5 = 15$   
Right side =  $3 \times 5 = 15$   
Total surface area =  $62 \text{ cm}^2$

**Surface area of cylinder** =  $2\pi r^2 + \pi dh$  \* special case



The 2 dimensions of the rectangular face are the circumference of the circular end and the height. So, the area of this face is  $\pi \times d \times h$ .

**Area of  $\bigcirc$**  =  $\pi r^2$   
=  $\pi \times 4^2 = 16\pi$

**Area of  $\square$**  =  $8\pi \times 10$   
=  $80\pi$

**Total SA** =  $32\pi + 80\pi$   
=  $112\pi \text{ cm}^2$



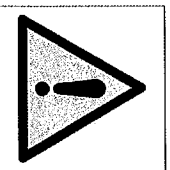
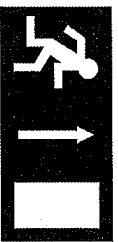
North East  
Learning Trust



## ENGINEERING KNOWLEDGE ORGANISER

### Health and Safety

- 1/ Describe 4 pieces of equipment that are used in engineering work shops.
- 2/ What are the hazards associated with using a Lathe?
- 3/ What type of protective equipment is used when working a workshop environment?
- 4/ Name 4 good safe working practices that we need to adhere to in our work shops.
- 5/ What are the safety control measures we use when using a furnace/forge?
- 6/ What are the dangers associated with the Guillotine?
- 7/ Explain the safety signs below:

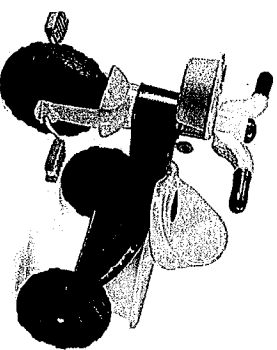


8/ Challenge: Justify the need for a risk assessment in a workplace.

- 9/ On a risk assessment what is the Risk Rating?
- 10/ What would you do if you noticed an issue with a piece of equipment?
- 11/ Who do you report safety issues to?
- 12/ Can hand tools be dangerous? If so how can we make sure we use them safely?
- 13/ How would carry a heavy materials safely?
- 14/ What is the safe and legal limit in Kg for lifting heavy objects?
- 15/ If there is a fire in the workshop what should you do?

- E - Environment
- S - Safety
- C - Customer
- A - Aesthetics
- P - Price
- E - Ergonomics
- F - Function
- M - Materials

Analyse one of the products below using ESCAPE FM



### Careers

- 1/ In Engineering there are many sectors you could work in, can you name 4 of them?
- 2/ What qualifications do employers like you to have to work in Engineering?
- 3/ Name 4 employability skills and employer needs to you to have.
- 4/ Name 4 issues that would make an employer consider that you should not work for them
- 5/ Name 4 colleges that provide FE (Further Education) training in your local area.
- 6/ What does Self-employed mean?
- 7/ What is the average wage of someone in the UK?
- 8/ Challenge: Research 3 available Engineering jobs on the internet.

Interesting links.

- <https://www.gov.uk/apply-apprenticeship>
- <https://www.engineeringjobs.co.uk/>
- <https://www.indeed.co.uk/>
- <https://www.cv-library.co.uk/>





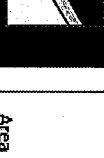




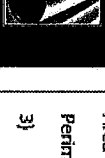
- 9/ Investigate what a CV is (Curriculum Vitae) and think how yours might look.
- 10/ How would you write a letter for an employer? Can you write a well presented letter that could help you apply for a job
- 11/ Research local colleges and find out when at least two open day/evening events are on.



## Materials

### DO NOW ACTIVITY

MATCH THE NAME OF THE COMPOSITE/SMART AND MODERN MATERIALS WITH THE IMAGES

|   |   |   |   |   |
|---|---|---|---|---|
|  |  |  |  |  |
|   |   |   |   |   |

### Product Analysis Help Sheet with Sentence Starters

- E – Ergonomics are how the product fits the human form
  - S – Safety is to ensure the product is safe for humans to use
  - C – Client is the type of person that would purchase it
  - A – Aesthetics is what the product looks like
  - P – Price is the cost of the materials, production and profit
  - E – Environment is the type of area it will be in and how is it environmentally friendly
  - F – Function is what the product does
  - M – Material is the product could be made from
- The product is **ergonomically** designed to fit the human form because.....The scooter is designed for children between 4 and 16 years old which means some parts may need to be adjustable. The handle bars are....
- The **materials** used to build the scooter will need to be..... The materials we could consider would be...../...../..... The properties of titanium are...../..... It can be used to.....It has a brake that works by.....

## ENGINEERING KNOWLEDGE ORGANISER

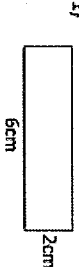
### Mathematics in Engineering:

Area =  $L \times H$  = .....m<sup>2</sup>

Perimeter =  $L + H + L + H$  = .....m

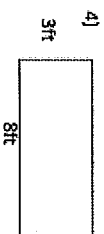
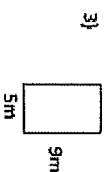
Work out the area and perimeter of the following rectangles.

They are not to scale. Remember - area inside and perimeter outside.



Area = \_\_\_\_\_ square cm Area = \_\_\_\_\_ square mm

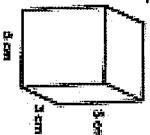
Perimeter = \_\_\_\_\_ cm Perimeter = \_\_\_\_\_ mm



Area = \_\_\_\_\_ square m Area = \_\_\_\_\_ square ft

Perimeter = \_\_\_\_\_ m Perimeter = \_\_\_\_\_ ft

Volume =  $L \times H \times D$  = .....m<sup>3</sup>

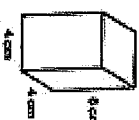
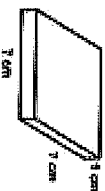


Volume = \_\_\_\_\_

Volume = \_\_\_\_\_

g.

h.

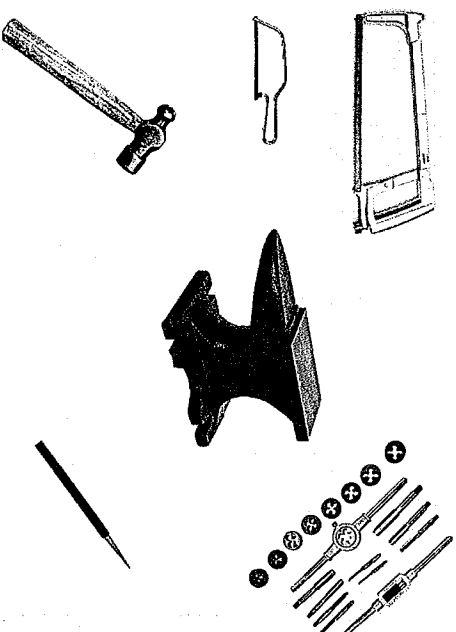


Volume = \_\_\_\_\_

Volume = \_\_\_\_\_

## Tools and Equipment

Name the tools and equipment



What are the three materials used to remove the scratches and polish up metal products?

What is accuracy and why is it important?

What is a tolerance used for and why is it important?

What is knurling and why do we use it?

Name 4 ways we can add a protective layer to metal.

Name 4 safety rules when working in a workshop.

Describe four different parts of the lathe and explain what they do.

Explain what forging is and why it is important.



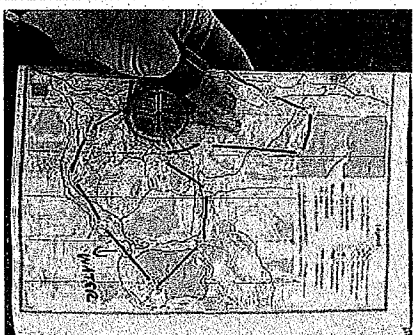
## Subject Knowledge Organiser

Pe

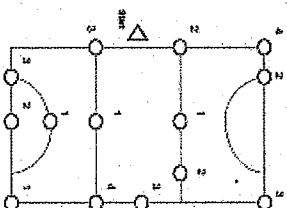
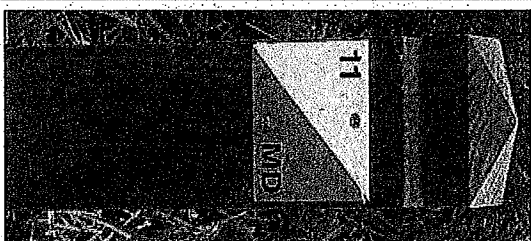
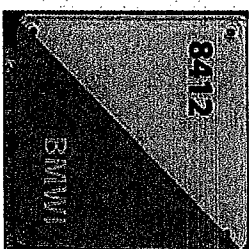
## Orienteering- Orienteate, observe, navigate, team work, communication

**Key Skills:**

1. The first thing you must do when map reading is to orientate your map (move it around) so it is the correct way around to where you are facing.
2. You then need to observe the surroundings before looking for the markings on the map. Once you have identified where you are standing you then find your starting point
3. You need to double check you are at the correct marker before starting because the only way you will successfully complete the course is by getting all answers correct.
4. Team work is key when completing an orienteering course as you will be working in pairs. You must communicate and discuss every decision before moving and navigating to the next cone. Mistakes can easily be made through poor communication.
5. As orienteering involves running, cardiovascular fitness is key as you will be running for a long period of time. To train for this, continuous training is useful as well as fartlek training (over different terrains at different speeds)



|    | M16 | 4,1 km | 120 m |
|----|-----|--------|-------|
| 1  | 40  | X      | 11    |
| 2  | 53  | X      |       |
| 3  | 46  | V      |       |
| 4  | 57  | X      |       |
| 5  | 32  | X      |       |
| 6  | 58  | X      |       |
| 7  | 47  | X      |       |
| 8  | 48  | X      |       |
| 9  | 49  | X      |       |
| 10 | 100 | X      |       |



**Example Courses**  
Set up as shown.

**ANSWERS**

- Course 1 = 14  
Course 2 = 15  
Course 3 = 11  
Course 4 = 12  
Course 5 = 13  
Course 6 = 10

**Rules and tactics:**

Orienteering requires physical fitness, skill in map reading, mental alertness and decisiveness. Orienteering teaches you to assess, understand and "read" the school site you are working in

The main aim of orienteering is to complete the course(s) correctly in the shortest amount of time, although it is based on map reading it is also a test of your physical fitness. You must find all the points that are placed on the map and record them on your sheet. Consider the ground you are moving over ensuring your safety at all times.

A major tactic is to use is your pace. As you are competing with the other people in your group. You must make sure you don't sprint off too quickly so that you are too tired to keep the pace up. If you take it steady the whole way- a jog and not walk- this tactic will help you to be successful

**Always remember:** The main aim of orienteering is to complete the course in the shortest amount of time, however good team work and planning of you route is vital to success.

**Progress Vocabulary:** *Identify, Define, describe, explain, compare and*

*contrast, sporting links, analyse, evaluate*

**Key Words:** Navigation; decision making; communication; cardiovascular fitness; speed; co-operation, orientation, map reading; observation; pace judgement; team work; safety and mental alertness



# Subject Knowledge Organiser

## HRF - Health, Fitness and Exercise, Consequences of a SL, Lifestyle choices & CoF

### Health, Fitness and Exercise

Health can be defined as 'complete physical, mental and social wellbeing and not only the absence of illness or infirmity'. Fitness can be defined as 'the ability to meet the demands of the environment'. Exercise can be defined as 'a form of physical exercise done to improve health or fitness or both'. Adults - five sessions of thirty minutes activity per week. The activity should be physical enough to cause the adult to breathe more deeply and to begin to sweat. Children and young people - seven sessions of sixty minutes per week. At least two of these sessions should be of high intensity exercise such as running, jumping or cardiovascular based sports.

### Consequences of a sedentary lifestyle

If a person does not take part in regular physical activity, exercise or sport then they are at risk of a number of illnesses and negative effects such as weight gain or obesity; heart disease; hypertension (high blood pressure); diabetes; depression; increased risk of osteoporosis and loss of muscle tone.

### Lifestyle choices

Other lifestyle choices can affect a person's health in either a positive or negative way. For example, eating a balanced diet means a person is less likely to become ill or put on excess body fat; getting enough sleep is important for the body to rest and brain to function optimally; not smoking as this causes illnesses such as bronchitis and lung cancer and not taking recreational drugs such as alcohol as in the short term it can lead to disorientation and poor decision-making and in the long term can lead to disease.

| Component of Fitness   |  | Definition  | Example   |
|------------------------|--|---|---|
| Body composition       |  | The percentage of body weight which is fat, muscle and bone                     | The gymnast has a lean body composition to allow them to propel themselves through the air when performing on the asymmetrical bars |
| Cardiovascular fitness |  | The ability of the heart, lungs and blood to transport oxygen                   | Completing a half marathon with consistent split times across all parts of the run  |
| Flexibility            |  | The range of motion (ROM) at a joint  | A gymnast training to increase hip mobility to improve the quality of their split leap on the beam                                  |
| Muscular endurance     |  | The ability to use voluntary muscles repeatedly without tiring                  | A rower repeatedly pulling their oar against the water to propel the boat towards the line  |
| Strength               |  | The amount of force a muscle can exert against a resistance                     | Fighting with all one's force in a rugby scrum against the resistance of the opposition pack  |
| Agility                |  | The ability to change the position of the body quickly and control the movement | A basketball player moving around the court from back to front and side to side at high speed and efficiency                        |
| Balance                |  | The ability to maintain the body's centre of mass above the base of support     | A sprinter holds a perfectly still sprint start position and is ready to go into action as soon as the gun sounds                   |
| Coordination           |  | The ability to use two or more body parts together                              | A trampolinist timing their arm and leg movements to perform the perfect tuck somersault  |
| Power                  |  | The ability to perform strength performances quickly                            | A javelin thrower applies great force to the spear while moving their arm rapidly forward   |
| Reaction time          |  | The time taken to respond to a stimulus   | A boxer perceives a punch from their left and rapidly moves their head to avoid being struck  |
| Speed                  |  | The ability to put body parts into motion quickly                               | A tennis player moving forward from the baseline quickly to reach a drop shot close to the net                                      |



## Year 9 Sentence Builder 1

### Family relationships

|  |   |                                     |  |  |  |  |
|--|---|-------------------------------------|--|--|--|--|
| <p>À mon avis<br/>[in my opinion]</p> <p>Je pense que<br/>[I think that]</p> <p>Je trouve que<br/>[I find that]</p> <p>Je crois que<br/>[I believe that]</p> <p>Je dois admettre que<br/>[I must admit that]</p> <p>Je dirais que<br/>[I would say that]</p> | je m'entends bien avec<br>[I get on well with]              | mon père<br>[my dad]                | <p>car<br/>[because]</p> <p>comme<br/>[as]</p> <p>mais<br/>[but]</p> <p>cependant<br/>[however]</p> <p>pourtant<br/>[however]</p> <p>toutefois<br/>[however]</p> |  | <p>très<br/>[very]</p> <p>vraiment<br/>[really]</p> <p>extrêmement<br/>[extremely]</p> <p>plutôt<br/>[rather]</p> <p>absolument<br/>[absolutely]</p> <p>un peu<br/>[a bit]</p> <p>assez<br/>[quite]</p> <p>trop<br/>[too]</p> <p>si<br/>[so]</p> <p>tout à fait<br/>[totally]</p> <p>incroyablement<br/>[incredibly]</p> | <p>intelligent [intelligent]</p> <p>gentil [kind]</p> <p>généreux [generous]</p> <p>agréable [pleasant, nice]</p> <p>ennuyeux [boring]</p> <p>nul [rubbish]</p> <p>désagréable [unpleasant]</p>        |
|  | j'adore<br>[I love]   | mon grand-père<br>[my grandad]      |  |  |  |  |
|  | je préfère<br>[I prefer]                                    | mon beau-père<br>[my step-dad]      |  |  |  |  |
|  | j'aime<br>[I like]  | mon demi-frère<br>[my half-brother] |  |  |  |  |
|  |   | mon oncle<br>[my uncle]             |  |  |  |  |
|  | je ne m'entends pas bien avec<br>[I don't get on well with] | ma mère<br>[my mam]                 |  |  |  | <p>intelligente [intelligent]</p> <p>gentille [kind]</p> <p>généreuse [generous]</p> <p>agréable [pleasant, nice]</p> <p>ennuyeuse [boring]</p> <p>nulle [rubbish]</p> <p>désagréable [unpleasant]</p> |
|  | je me dispute avec<br>[I argue with]                        | ma sœur<br>[my sister]              |  |  |  |  |
|  | je me fâche de<br>[I fall out with]                         | ma grand-mère<br>[my grandma]       |  |  |  |  |
|  | je déteste<br>[I hate]                                      | ma belle-mère<br>[my step-mam]      |  |  |  |  |
|  | je n'aime pas<br>[I don't like]                             | ma demi-sœur<br>[my half-sister]    |  |  |  |  |



# Year 9 Sentence Builder 2 Describing people

|   |                                  |                    |                                    |  |   |                              |  |
|---|----------------------------------|--------------------|------------------------------------|--|---|------------------------------|--|
| <p>Mon acteur préféré<br/>[My favourite actor]</p> <p>Mon footballeur préféré<br/>[My favourite footballer]</p> <p>Mon joueur préféré<br/>[My favourite player]</p> <p>Mon musicien préféré<br/>[My favourite musician]</p> <p>Mon écrivain préféré<br/>[My favourite writer]</p> <p>Mon artiste préféré<br/>[My favourite artist]</p> <p>Mon influenceur préféré<br/>[My favourite influencer]</p> | <p>s'appelle<br/>[is called]</p> | <p><b>NAME</b></p> | <p>et il a<br/>[and he has]</p>    | <p>les yeux verts<br/>[green eyes]</p> <p>les yeux bleus<br/>[blue eyes]</p> <p>les yeux marron<br/>[brown eyes]</p> <p>les cheveux blonds<br/>[blond hair]</p> <p>les cheveux noirs<br/>[black hair]</p> <p>les cheveux roux<br/>[red hair]</p> <p>les cheveux bruns<br/>[brown hair]</p> <p>les cheveux longs<br/>[long hair]</p> <p>les cheveux mi-longs<br/>[mid-length hair]</p> <p>les cheveux courts<br/>[short hair]</p> <p>les cheveux bouclés<br/>[curly hair]</p> <p>les cheveux raides<br/>[straight hair]</p> | <p>et en plus<br/>[and additionally]</p> <p>et aussi<br/>[and also]</p> | <p>il est<br/>[he is]</p>    | <p>grand<br/>[big/tall]</p> <p>petit<br/>[small]</p> <p>mince<br/>[sim, thin]</p> <p>de taille moyenne<br/>[average size/height]</p>   |
|   |                                  |                    | <p>et elle a<br/>[and she has]</p> |  |   | <p>elle est<br/>[she is]</p> | <p>grande<br/>[big/tall]</p> <p>petite<br/>[small]</p> <p>mince<br/>[sim, thin]</p> <p>de taille moyenne<br/>[average size/height]</p> |



| WORD         | DEFINITION  |
|--------------|---|
| Novella      | A short novel, that is, a narrative prose fiction whose length is shorter than that of most novels, but longer than most short stories. |
| Pastoral     | Portraying an idealised version of country life.  |
| Pastoral     | Relating to the pleasant aspects of the countryside and country life.   |
| Ideology     | A system of ideas, ideals and beliefs.  |
| Rebellion    | An act of armed resistance to an established government or leader, or resisting authority and control.                                  |
| Revolution   | A forcible overthrow of a government or social order, in favour of a new system.  |
| Propaganda   | Information, often of a biased or misleading nature, used to promote a cause or point of view.  |
| Conformity   | Behaving according to socially accepted norms and conventions.  |
| Dictatorship | A dictator is someone who keeps control by force and power; a dictatorship is a country or organisation ruled by a dictator.            |
| Proletariat  | A collective noun to refer to working-class people as a whole; a Marxist idea.  |
| Potential    | A system of government in which there is complete control and people do not feel able to speak out or protest.                          |
| Orwellian    | Characteristic of or like the works of George Orwell: for example something dystopian or about dictatorships.                           |
| Marxist      | Marxist ideas relate to Marx's belief in struggling for equality, and that workers should control the means of production.              |
| Novella      | A short novel, that is, a narrative prose fiction whose length is shorter than that of most novels, but longer than most short stories. |

| ANIMAL FARM    |   | Key Information             | Published 1945   |
|----------------|---|-----------------------------|--|
| SUMMARY        |   | Key Information             | All allegorical text based on the Russian Revolution of 1917   |
| One            | An introduction to the characters of Animal Farm and Old Major gives a speech to rouse the animals.                                     | George Orwell               | • Subtitled 'A Fairy Story'<br>• A fable or morality story   |
| Two            | Old Major dies and the animals carry out the Rebellion. Mr Jones leaves the farm.   | George Orwell               | • Born 1903, died in 1950 of tuberculosis<br>• Attended Eton but then joined the police<br>• Left the police to become a writer<br>• Fought in the Spanish Civil War in 1937<br>• Worked for the BBC creating propaganda<br>• Believed in socialism and a better world |
| Three          | A summary of the day-to-day running of the farm. Napoleon takes the pups and Snowball & Squealer take control.                          | Russian Revolution 1917     | • Tsar Nicholas II was the incompetent ruler<br>• The workers of Russia were frustrated<br>• Lenin and Trotsky were inspired by the Russian Revolution<br>• Lenin led the Bolsheviks, who seized power in 1917<br>• Russia became the Soviet Union                     |
| Four           | The men attempt to re-take the farm and are defeated by the animals in the Battle of the Cowshed.                                       | Stalin's Soviet Union       | • Stalin became leader in 1927<br>• His regime was brutal, with violence (work houses and prisons) to punish<br>• Stalin and the Communists controlled everything  |
| Five           | Mollie leaves the farm; there is debate over the windmill; Napoleon overthrows Snowball.  | Communism                   | A social system in which the government means of production (e.g. factories) are owned and controlled by the community for the distribution of goods.  |
| Six            | The pigs begin to break the rules and the windmill is destroyed.  | WWII                        | • Written in 1945 at the end of WWII<br>• Rise of dictatorships in Europe – Hitler in Germany, Stalin in Russia<br>• Conflict between capitalist Britain and communist Russia  |
| Seven          | Snowball is revealed to be in league with humans; Napoleon slaughters the unfaithful animals; Beasts of England is banned.              | Power War/Conflict Violence | KEY THEMES   |
| Eight          | Napoleon's power grows and the windmill is destroyed by the men   | Responsibility Corruption   |  |
| Nine           | Boxer is taken away and dies.   | Hopes and Dreams            |  |
| Ten            | Many years pass. The pigs become almost like humans as all animals are no longer equal.   |                             |  |
| KEY CHARACTERS |   |                             |  |
| Mr Jones       | The incompetent human farmer who ran Manor Farm and was evicted. He tries to regain control but eventually fails.                       |                             |  |
| Old Major      | The old pig who has a dream of a better future. He tells the animals about it and inspires a rebellion after his death.                 |                             |  |
| Napoleon       | The totalitarian dictator who takes over the running of Animal Farm and installs a brutal and shocking regime.                          |                             |  |
| Snowball       | The pig who tries to lead Animal Farm and is initially a hero. He is expelled and considered a traitor after the Battle of the Cowshed. |                             |  |
| Squealer       | The pig who spreads propaganda around the farm and delivers messages from the pigs to the other animals.                                |                             |  |
| Benjamin       | The old, cynical donkey who does not believe life can ever improve. He is close to Boxer and devastated by his death.                   |                             |  |
| Boxer          | The hardworking but not intelligent horse who is sent to the slaughterhouse when he grows old. Motto: I will work harder.               |                             |  |
| Clover         | The female horse who suspects the pigs are not behaving fairly but is not clever enough to rebel. She is a part of the propaganda.      |                             |  |
| Mollie         | The vain, female horse who prefers sugar and ribbons to hard work and who leaves the farm and works for a human.                        |                             |  |
| Moses          | The raven who tells the other animals about Sugarcandy Mountain. Initially, he leaves the farm after the war.                           |                             |  |

|   |  |       |                |              |            |          |                  |
|---|--|-------|----------------|--------------|------------|----------|------------------|
| Key Information   | Published 1945   |       |                |              |            |          |                  |
|   | <ul style="list-style-type: none"> <li>All allegorical text based on the Russian Revolution</li> <li>Subtitled 'A Fairy Story'</li> <li>A fable or morality story</li> </ul>   |       |                |              |            |          |                  |
| George Orwell   | <ul style="list-style-type: none"> <li>Born 1903, died in 1950 of tuberculosis</li> <li>Attended Eton but then joined the police</li> <li>Left the police to become a writer</li> <li>Fought in the Spanish Civil War in 1937</li> <li>Worked for the BBC creating propaganda</li> <li>Believed in socialism and a better world</li> </ul> |       |                |              |            |          |                  |
| Russian Revolution 1917   | <ul style="list-style-type: none"> <li>Tsar Nicholas II was the incompetent ruler</li> <li>The workers of Russia were frustrated</li> <li>Lenin and Trotsky were inspired by the revolution</li> <li>Lenin led the Bolsheviks, who seized power</li> <li>Russia became the Soviet Union</li> </ul>   |       |                |              |            |          |                  |
| Stalin's Soviet Union   | <ul style="list-style-type: none"> <li>Stalin became leader in 1927</li> <li>His regime was brutal, with violence (work houses and prisons) to punish dissent</li> <li>Stalin and the Communists controlled everything</li> </ul>  |       |                |              |            |          |                  |
| Communism   | A social system in which the government controls the means of production (e.g. factories) and distributes goods.   |       |                |              |            |          |                  |
| WWII  | <ul style="list-style-type: none"> <li>Written in 1945 at the end of WWII</li> <li>Rise of dictatorships in Europe – Hitler</li> <li>Conflict between capitalist Britain and communist Russia</li> </ul>   |       |                |              |            |          |                  |
| <table border="1"> <tr> <td>Power</td> <td>Responsibility</td> </tr> <tr> <td>War/Conflict</td> <td>Corruption</td> </tr> <tr> <td>Violence</td> <td>Hopes and Dreams</td> </tr> </table>   |  | Power | Responsibility | War/Conflict | Corruption | Violence | Hopes and Dreams |
| Power   | Responsibility   |       |                |              |            |          |                  |
| War/Conflict  | Corruption   |       |                |              |            |          |                  |
| Violence  | Hopes and Dreams   |       |                |              |            |          |                  |
| <h3>KEY THEMES</h3> <p>Animal Farm and was evicted. He tries to regain control but eventually fails. He is expelled and considered a traitor after the rebellion. He is a hero. He is expelled and considered a traitor after the rebellion. He is a hero. He is expelled and considered a traitor after the rebellion. He is a hero.</p> |  |       |                |              |            |          |                  |