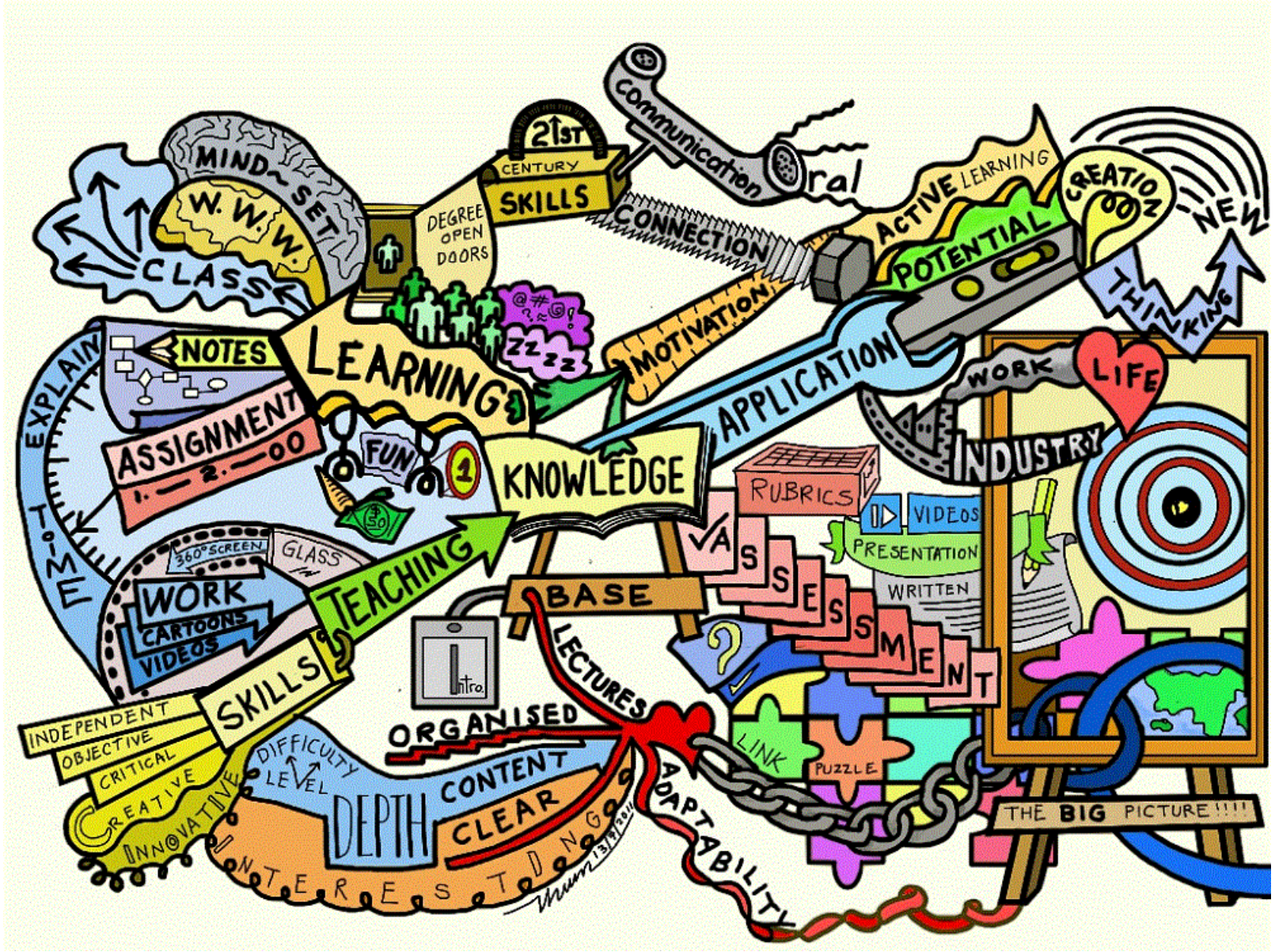
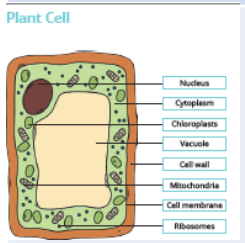
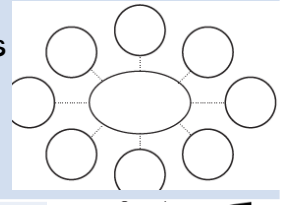


Summer 1 - Year 9 Name:

Just reading through your books or a knowledge organiser is not always an effective way to revise. Instead, you should do something with the information. Choose an example of the revision methods on the pages or see if you can come up with another method.

Idea	Explanation
Make some flash cards or PowerPoint slides. Make top trumps. 	Write down key words, quotation, questions or equations on one side of a card. On the other side, write the definition or answer. Use them to test yourself.
 Make a poster.	Turn your notes into posters with lots of colour and illustrations. Summarising the key information in a different way is an effective way of learning and your brain will remember the colours more easily. Do the title last!
Draw spider diagrams, or for the adventurous mind maps. 	Write the topic/keyword in the centre of your page. Add everything you know in subtopics. Then explore each subtopic in turn adding more ideas. Colour/pictures help you recall.
Write a song or a rap. 	Are there songs that stick your head. Change the lyrics to the information you want to learn. If you record and listen back it will be a more fun way of revising.
 Plan a lesson	If you teach something to someone else the chance of recalling it is really high. This has been found to be the most effective way of learning something for the long term.
Write a story or comic strip. 	Take the keywords or facts that you need to learn and turn them into a story or a cartoon. The sillier the story the more likely you are to remember it.
Write a quiz. Design a game. 	Playing is how we learn as young children and it is a very powerful way of learning throughout life. If we enjoy the game it helps us remember.

Multi-disciplinary learning. Key Stage 3.

What is a conspiracy theory?

Some people believe in things that other people do not. Here are a couple of examples for which there is little evidence.

Bigfoot lives in the Northwest Pacific area of North America

There is a Plesiosaur (The Loch Ness Monster) living Loch Ness in Scotland

However, some people then believe that other people are covering it all up. This can lead to some surprising places.

Activity 1: If there was Bigfoot or a Plesiosaur as shown above then how difficult would it be to keep it a secret? Look up how big Lock Ness is and how many people visit it every year.

Activity 2: Think about these questions / discuss them in a video chat with friends: What happens to you when you believe that the entire sections of society are keeping secrets? How could all scientists or the entire government keep a secret? How difficult would it be for 1000s of people to keep a secret? Why do film makers like conspiracy theories for their movies?

Activity 3: Listen to this radio programme. It is available on BBC Sounds. https://www.bbc.co.uk/sounds/play/m000dfqn

How many conspiracy theories are mentioned? Which ones have you heard about?

Activity 4: Mr Ford once, for a joke spread the rumour that the canteen at his college was serving Weetabix that were so cheap, the box they came in had more nutritional value as at least it contained roughage in the cardboard box. he got into a lot of trouble and had to write an apology to be displayed at the college canteen till. Write a letter for Mr Ford, to try to explain that he now understands how serious disinformation can be, highlighting what might have gone wrong.

Activity 5: Craft a conspiracy theory about Mr Ford. Email him with it. How would you get people to believe it? How far could you stretch it? How could you stop it once people started believing it – even if it was you who made it up?

For those of you with access to Disney watch Lion Guard "Beware of the Zimwi" episode. How can belief cause panic?

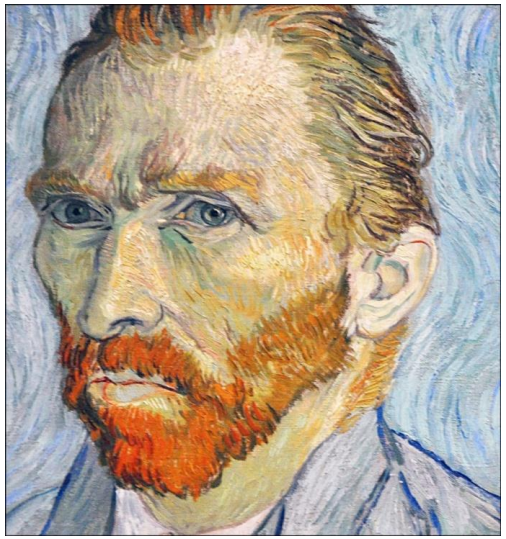
Activity 6: Find out how anti-vaccination conspiracy theory has killed people.

https://www.iflscience.com/health-and-medicine/one-map-sums-damage-caused-anti-vaccination-movement/

Activity 7: Challenge activity. Research one of the more popular myths and present a clear and referenced case to debunk it.

https://www.osce.org/odihr/441101?download=true

Year 9 self-Portraits

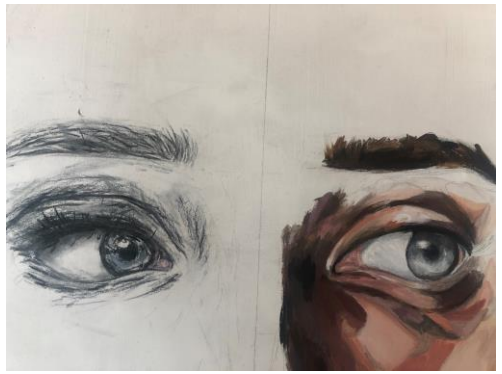


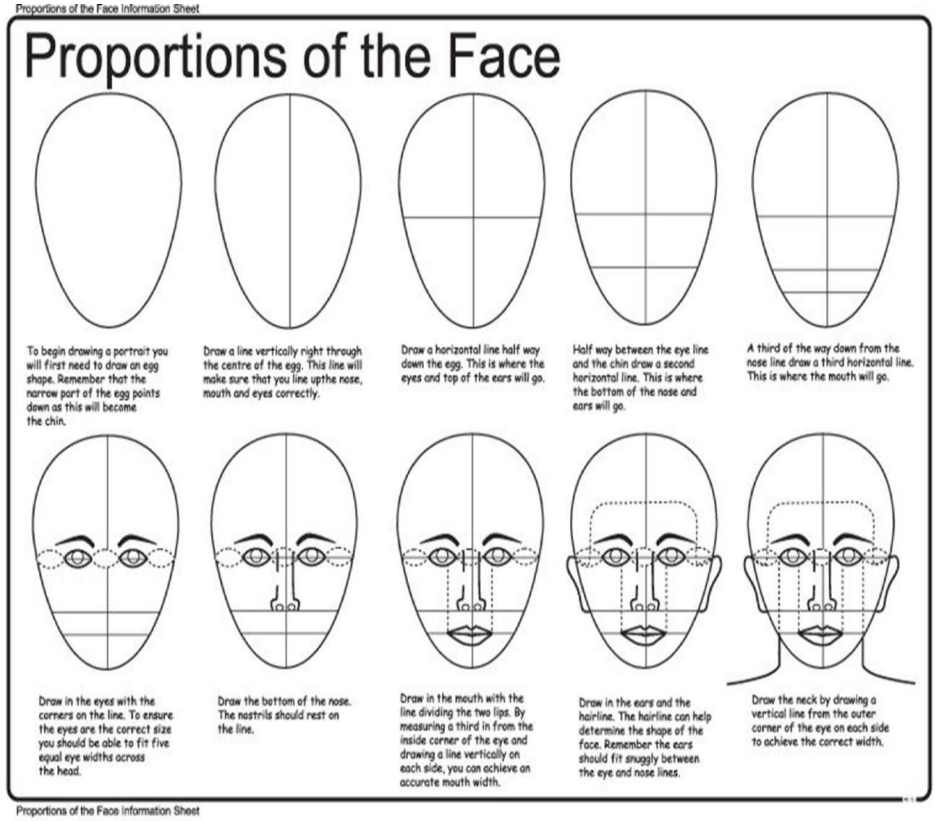
Overview:

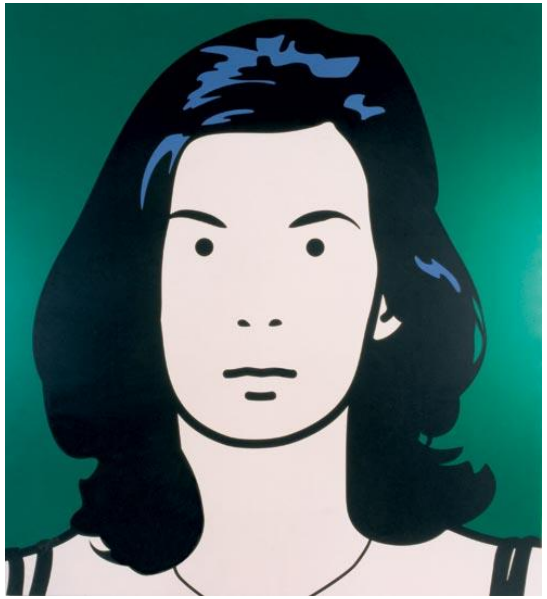
To create a self-portrait that has both realistic and stylised elements.

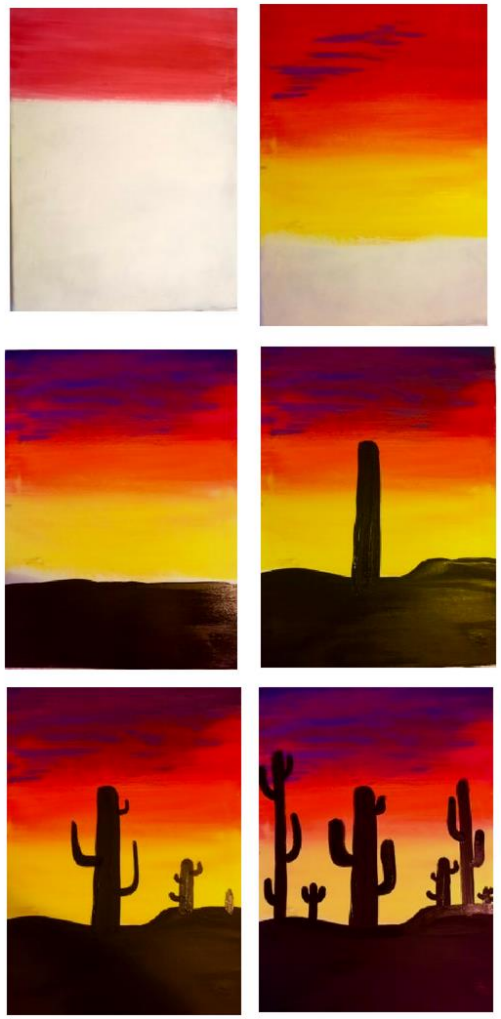
To demonstrate the portraiture and mixed media skills you have learned so far this year in Art.

This diagram shows the rough proportions of the human face.
You will learn about this and how to draw facial features like the
Eyes below:

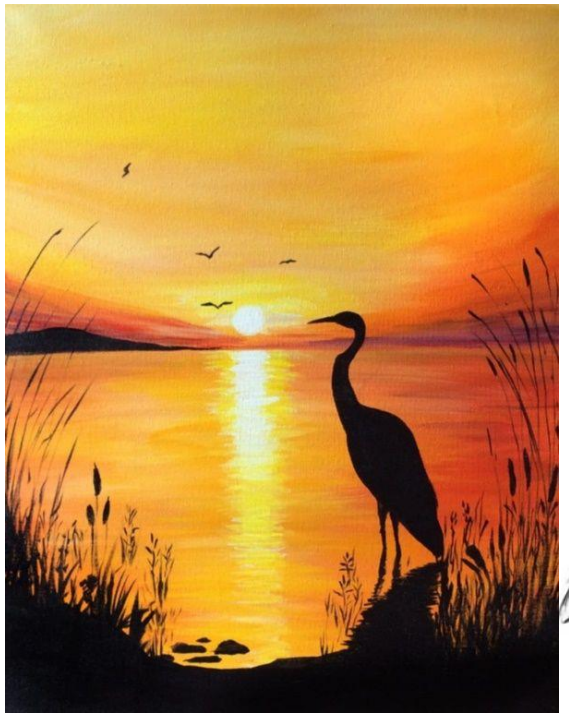








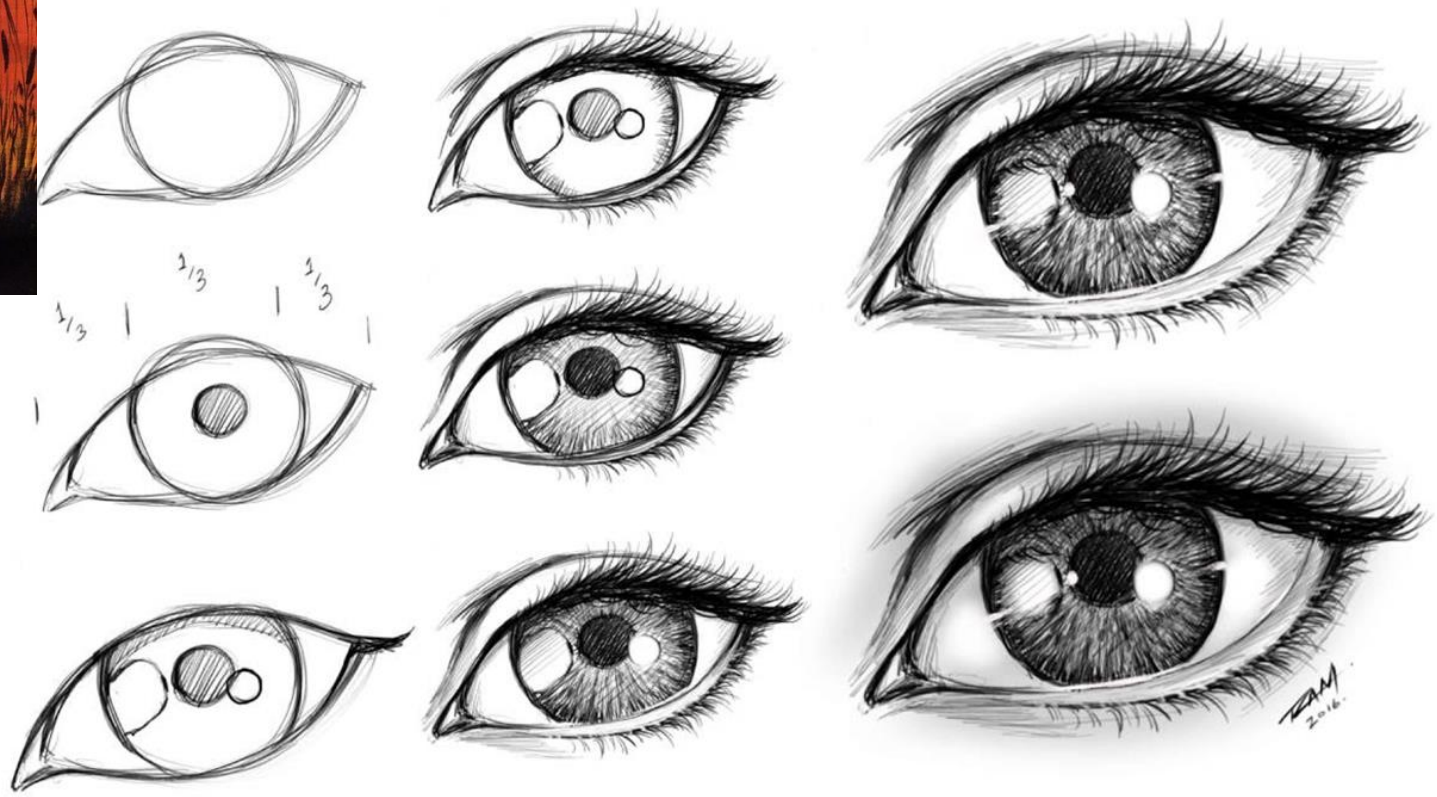
Silhouette Landscape Painting



Eye Studies

Activity – these should create a portfolio of work where you develop your skills:

1. Complete an eye study of each member of your household.
2. Draw the landscape outside your window at different times of day. If you can colour as well try to create a desert landscape.
3. Practise using the different ink shading techniques.
4. Create your own knowledge organiser for art.



1

Methods of Recording

Observational drawing	Drawing from looking at images or objects
First hand observation	Drawing directly from looking at objects in front of you
Second hand observation	Drawing from looking at images of objects
Photographs	Using a camera or smartphone to record images will class as first hand observation
Sketches	Basic sketches and doodles can act as a starting point for development

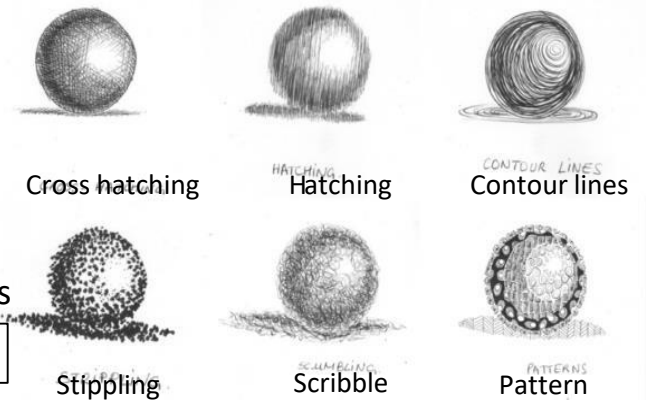
Stages of Drawing

Basic shapes → Accurate shapes → Detail → Shade

2

Tonal shade
Produce a range of tones by varying the pressure and layering consider using softer pencils for darker shades

Alternative shade techniques



3

Annotation

Describes writing notes, using images and explaining your thoughts to show the development of your work.

Step 1 Describe
What is this an image of?
What have you done here?
What was this stage of the project for?

Step 2 Explain
How was this work made?
How did you produce particular effects? How did you decide on the composition?

Step 3 Reflect
Why did you use these specific methods? Why do particular parts work better than others?
Why might you do things differently next time?

Art Key Stage 3

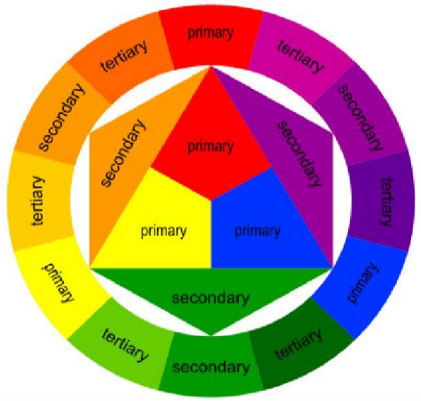
1- Formal elements are taught e.g. how to sketch and use tone to create a 3D effect. You will explore the colour wheel and how to use the basic materials in Art.
2-"The Greenman" – This project introduces you to facial proportions and how to blend oil pastels effectively. We also learn about clay and create small 3D Greenman faces. Examples of world renowned pieces of art are discussed.
3-"Perspective Landscapes"- This project introduces students to the concept of perspective and distance in Art. You learn about the technique of one-point perspective to create a feeling of depth in a landscape.

1

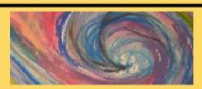
Media	The substance that an artist use to make art
Materials	The same as media but can also refer to the basis of the art work eg, canvas, paper, clay
Techniques	The method used to complete the art work, can be generic such as painting or more focus such as blending
Processes	The method used to create artwork that usually follows a range of steps rather than just one skill

3

Colour Theory	
Primary= RED, YELLOW, BLUE	Complimentary; Colours opposite on the colour wheel
Secondary= Primary+Primary	Harmonious; Colours next to each other on the wheel
Tertiary= Secondary+Primary	Monochromatic; shades, tones & tints of one colour
Shades – add black	Hue – the pigment
Tint – add white	Warm; RED, ORANGE YELLOW. Cold; BLUE, GREEN, PURPLE



2

Pencil		The basic tool for drawing, can be used for linear work or for shading
Biro		Drawings can be completed in biro and shaded using hatching or cross hatching
Pastel (chalk/oil)		Oil and chalk pastels can be used to blend colours smoothly, chalk pastels give a lighter effect
Coloured pencil		Coloured pencil can be layered to blend colours, some are water soluble
Acrylic paint		A thick heavy paint that can be used smoothly or to create texture
Watercolour		A solid or liquid paint that is to be used watered down and layered
Gouache		A pure pigment paint that can be used like watercolours or more thickly for an opaque effect
Pressprint		A polystyrene sheet that can be drawn into to print white lines – can be used as more than 1 layer
Monoprint		Where ink is transferred onto paper by drawing over a prepared surface
Collograph		A printing plate constructed of collaged materials
Card construction		Sculptures created by building up layers of card or fitting together
Wire		Thick or thin wire manipulated to create 2d or 3d forms
Clay		A soft substance used for sculpting, when fired can be glazed to create shiny colourful surfaces
Batik		A fabric technique using hot wax to resist coloured inks
Silk painting		Fabric inks painted onto silk, Gutta can be used as an outliner to prevent colours mixing

Art Key Stage 3

1

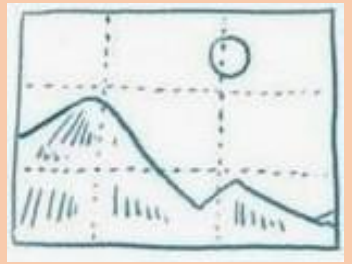
Formal Elements of Art

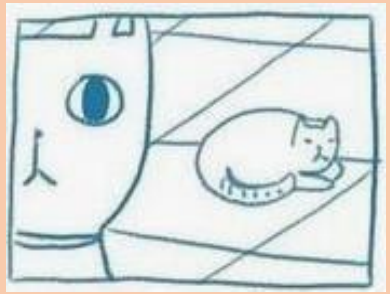
LINE	the path left by a moving point, e.g. a pencil or a brush dipped in paint. It can take many forms. e.g. horizontal, diagonal or curved.
TONE	means the lightness or darkness of something. This could be a shade or how dark or light a colour appears
TEXTURE	the surface quality of something, the way something feels or looks like it feels. There are two types : Actual and Visual
SHAPE	an area enclosed by a line. It could be just an outline or it could be shaded in.
PATTERN	a design that is created by repeating lines, shapes, tones or colours. can be manmade, like a design on fabric, or natural, such as the markings on animal fur.
COLOUR	There are 2 types including Primary and Secondary . By mixing any two Primary together we get a Secondary

2

Composition Layouts

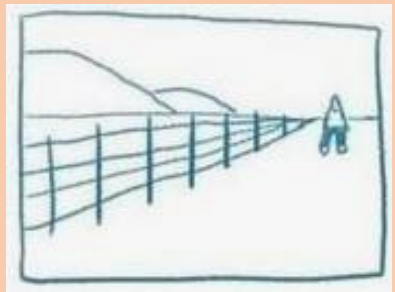
Rule of thirds – Place focal objects at 1/3 or 2/3 of the image horizontally or vertically. Not in the middle





Balance elements. If there is an emphasis on one side balance it out with smaller objects on the other

Simplify and fill. Enlarge or crop the image to fill the space



Use lines. Lines will draw the viewer in, they don't have to be straight, consider S or C

3

A Rough	A Visual/ Maquette	Final Piece
A basic sketch of a final idea	A small image or model created in selected materials	An image or sculpture pulling all preparatory work together

Art Key Stage 3

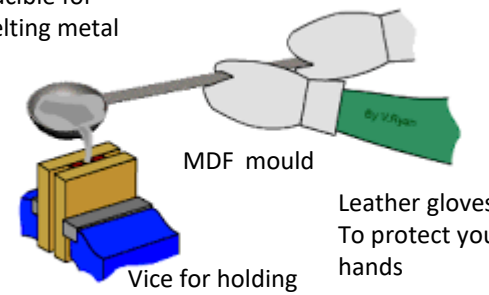
Knowledge Organiser: Year 9 Metal and Wood

Pewter

Pewter is a grey metal which is made by mixing tin and lead. Pewter was often used in former times to make ornaments or containers for eating and drinking. It's melting point is about 240*C.

Pewter casting

Recognise what safety equipment is needed and when it is necessary

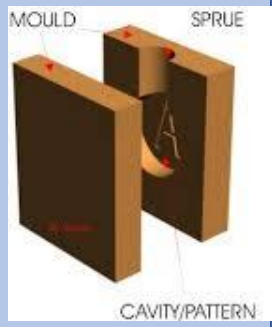


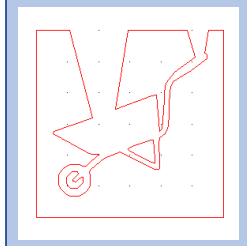
Crucible for Melting metal

MDF mould

Leather gloves To protect your hands

Vice for holding The mould





CAD mould
60mm x 60mm
Runner – where you pour in the pewter
Riser – allows the pewter to fill a complicated mould by forcing the metal up the riser

1 Cut off the sprue with a junior hacksaw

2 File sharp edges with a file

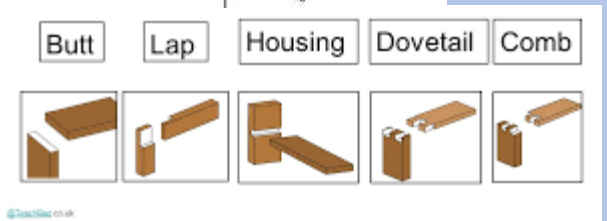
3 Use a pillar drill to make a hole for your keyring

4 Use wet and dry sandpaper to smooth the pewter

5 Use a polisher to shine your metal keyring

Pine and MDF

Wood comes in 3 categories: soft wood, hard wood and manufactured wood. They have different properties and are used for many things.



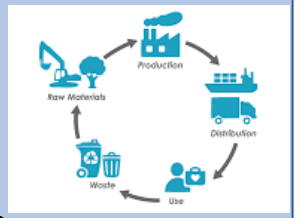
Choose a wood joint, determined by what you are making and how it will be used.

Measuring, marking out and cutting pine to make a box

Use a ruler to measure accurately, use a set square to mark accurate angles and use a tenon saw or fret saw to cut wood.

Life Cycle Assessment

Is a technique to assess environmental impacts associated with all the stages of a product's life from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling.
LCA is also used in new product research and development, when environmental footprint is important to the future marketing or cost structure of a product.



FSC

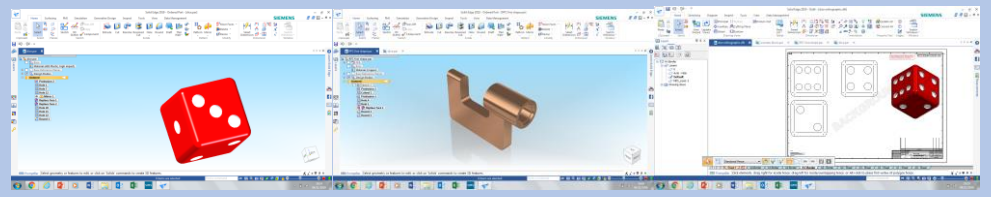
Forest Stewardship Council®

The FSC system allows businesses and consumers to identify, purchase and use wood, paper and other forest products made with materials from well-managed forests and/or recycled sources. FSC helps take care of forests and the people and wildlife who call them home. So you can keep your life full of forest products while keeping our forests full of life. Forests are good for us. They provide a great environment for hiking and other outdoor pursuits and are even proven to have therapeutic properties.

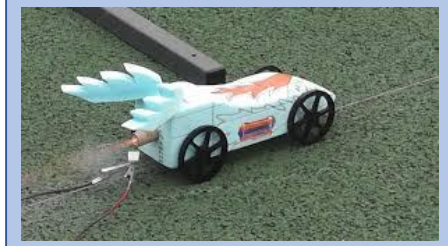
Knowledge Organiser: Year 9 3D CAD/Rocket Car/Modelling

3D CAD

At Open Academy we use Solid Edge 3D CAD programme.
CAD (computer-aided design) software is used by architects, engineers, drafters, artists, and others to create precision drawings or technical illustrations.

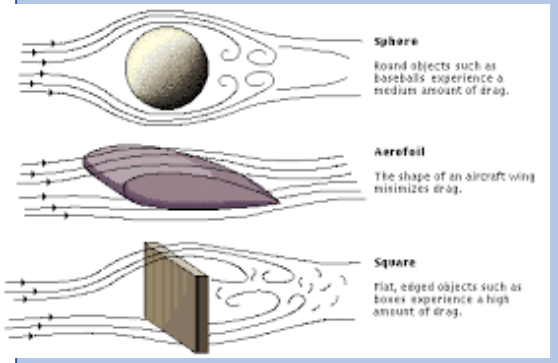


Rocket cars



Aerodynamics is the study of how gases interact with moving bodies. Because the gas that we encounter most is air, aerodynamics is primarily concerned with the forces of drag and lift, which are caused by air passing over and around solid bodies.

Automotive aerodynamics is the study of the aerodynamics of road vehicles. Its main goals are reducing drag and wind noise, minimizing noise emission, and preventing undesired lift forces and other causes of aerodynamic instability at high speeds.
The most aerodynamic shape is typically known as the teardrop - it's the shape water forms when it runs down a window because it's been pushed into that position by the air flowing over it on the way down.

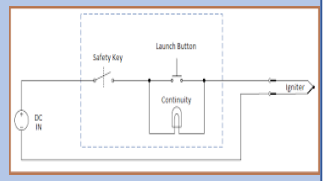


Rocket motor

The rocket motor is the device in the model that creates the thrust force that propels the car along the wire. It creates the fire, smoke, and noise that make rocketry so exciting to watch.

Simple rocket launch detonator

The safety key is activated and causes a buzzer to sound. This alerts the user that the launch button is ready. The launch button is pressed which heats the wire and ignites the rocket.



Modelling/Prototyping

It is always a good idea to make models of your ideas, before deciding on the final design. Models can be computer generated or manufactured by hand, to a scale. This will help you determine whether your idea is going to work or needs modifying. A model allows you to test your solution quickly and cheaply. You could ask your client / customer if the design is what they are looking for?

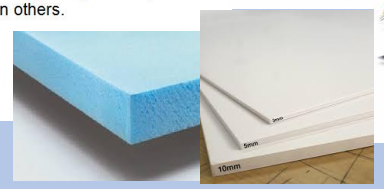
Advanced modelling

What is modelling?

Modelling is a very important area of product design. It is the point where you have an idea and need to realise it in 3D – this can be done at any stage of the design process. Some designers prefer to produce models or prototypes at earlier stages than others.

You can model using practical materials such as modelling card, foam etc

The alternative to solid modelling is to use 3D CAD.



Modelling materials and equipment

3D prototyping

Rapid prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data. Construction of the part or assembly is usually done using 3D printing or "additive layer manufacturing" technology

Iterative Design Process

Iterative design is a design methodology based on a cyclic process of prototyping, testing, analysing, and refining a product or process. Based on the results of testing the most recent iteration of a design, changes and refinements are made

Health and Safety

Micro-organisms

Micro-organisms are tiny forms of life. They can only be seen under a microscope and are sometimes called microbes.
They spoil food and make it unsafe to eat because they contaminate it with their waste products, their physical presence and the toxins they produce.

What micro-organisms can spoil food and make it unsafe to eat?

There are three groups of micro-organisms that you need to know about that spoil food and cause food poisoning. These are..

- Bacteria
- Moulds
- Yeasts

Micro organisms need 5 conditions to grow and multiply:

1. A warm temperature
2. Plenty of moisture (water)
3. Plenty of food
4. The right PH level (not too acidic or alkaline
5. Enough time (bacteria split every 10-20 minutes)

High risk foods

- High risk food have ideal conditions for bacteria
- High risk foods are ready to eat foods that could grow harmful bacteria
- They are moist and high in protein which is food for bacteria.
- High risk foods have a short shelf life – you can't keep them for long or the bacteria might multiply to dangerous levels.

Examples of high risk foods:

Cooked meat, fish and poultry, dairy products (eggs, cheese etc.), gravies, stocks and sauces, shellfish, cooked rice

Example exam questions:

What five conditions to bacteria need to grow and multiply? (5 marks)
What is a high risk food? (5 marks)

Storing food safely

Cooking (75°C)	The danger zone (5°C-63°C)
• Cooking food above 75°C kills bacteria • Re-heat food properly, only once. Reheat food so 75°C for at least 3 minutes • Check the food is 75°C with a temperature probe	• Bacteria can grow and multiply quickly between 5°C to 63°C. • This is called the danger zone • The optimum temperature for bacterial growth is 37°C
Chilling (0°C – 5°C)	**Freezing (-18°C)**
• Keeping food between 0°C and 5°C slows down the growth of bacteria • This extends the shelf life of food • Chilling food doesn't change the properties much – food looks and tastes the same	• Freezing food below -18°C stops bacteria growing – they become dormant • Freezing generally extends shelf life and the nutrients aren't lost • It doesn't kill the bacteria though. They become active again once the food defrosts.

Preparing self for cooking

- Tie hair back to prevent hair and dandruff falling in food
- Take off coats and blazers
- Wear an apron to prevent bacteria transferring from our clothes to our food
- Wash hands with hot soapy water to kill bacteria

Preparing the room for cooking

- Sanitise all work surfaces
- Check equipment is clean and dry
- Tuck all stools in as they can be a trip hazard
- Put all high risk foods in the fridge to slow bacteria growth

Wash your hands after:

- Coughing
- Sneezing
- Tying shoe laces
- Going to the toilet
- Touching hair or face

Nutrition

Nutrients

Macro nutrients – needed in large quantities in the diet. The three macro nutrients are: PROTEIN, CARHOHYDRATES, FAT
Micro nutrients – needed in small quantities in the diet. The two micro nutrients are: VITAMINS, MINERALS

Protein

Proteins are made up of amino acids, often referred to as the 'building blocks' of the body. Non-essential amino acids can be made by the body, how ever, essential amino acids cant be made by the body and we must get from the food we eat.
High biological Value (HBV) proteins contain all the essential amino acids we need and generally come from animal sources. Low biological value (LBV) proteins are missing one of more essential amino acids and generally come from plant sources.

Food sources

HBV - beef, pork, lamb, poultry (chicken, turkey, duck), fish, cheese, butter milk
LBV – beans, chickpeas, lentils, peas, nuts, seeds, found in smaller amounts in some vegetables such as spinach and broccoli.

Function

Needed for growth from childhood to adulthood and the growth of nails, hair and muscle mass, repair of muscles, tissues and organs after illness or injury and to make enzymes for digestion and antibodies to stop us getting ill.
Types: High biological Value (HBV) and Low biological Value (LBV)

Carbohydrates

There are two types of carbohydrates, complex and simple. They are also known as starchy (complex) and sugary (simple).

Food sources

Starchy – bread, rice, pasta, potatoes, bagels, oats, flour, cereal and some vegetables.
Simple – fruit, some vegetables, chocolate, sweets, biscuits, cakes

Function

Starchy/complex carbohydrates are digested slowly meaning blood sugar levels gradually increase providing a slow, steady release of energy. (long term energy).
Sugary/simple carbohydrates are digested quickly and provide short term energy
Types: Starchy, sugary and fibrous

Example exam questions:

What are the two types of fat? (2 marks)
Explain the difference between a HBV and LBV protein (6 marks)
What percentage of our daily energy should come from fats? (1 mark)
What are the main differences between saturated and unsaturated fats? (6 marks)
How can one make healthy choices when choosing complex carbohydrates? (2 marks)

Fat

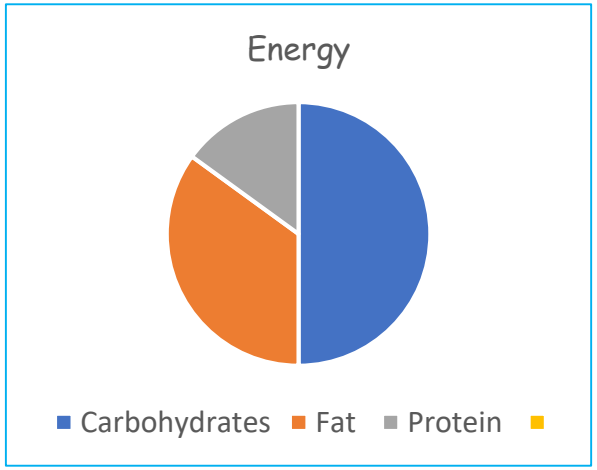
There are two types of fat, saturated and non saturated.
Saturated fats are classed as 'unhealthy fats', they are solid at room temperature and are generally animal based.
Unsaturated fats are classed as 'healthier fats' and are liquid or soft at room temperature and come from plant based sources.

Food sources

Animal –beef, chicken skin, processed meat (sausages, salami, pepperoni), bacon, butter, cheese, full fat milk
Plant – vegetable oils (sunflower, olive, rapeseed), avocado, nuts, seeds

Function

Keeps us warm (provides insulation), secondary source of energy, protects vital organs and bones.



Energy intake

50% - carbohydrates

35% - Fat

15% - Protein

Dietary related health problems

Diabetes

What is it?
Diabetes lets your blood glucose levels run out of control. Insulin is a hormone that allows glucose to be absorbed by the body. If there is too much glucose in the blood, the pancreas produces insulin to reduce the blood glucose level. Type 2 diabetes is a disorder where blood glucose levels stay too high – the pancreas either can't produce enough insulin or the body resists it.

Causes
- Being over weight or obese
- Excessive sugar in the diet can leave to obesity, increasing the risk of type 2 diabetes – this is affecting more young people.

Health problems
- Poor eye sight, limb numbness, kidney failure and CHD.
- Tired and thirsty
- The body passes out glucose by passing urine more often

Obesity

What is it?
It is very common, it affects roughly 1 in 4 adults in the UK. Body Mass Index (BMI) is often used to check if someone is overweight or obese.

Causes
- An incorrect balance of energy – a person consumes more calories than they burn off.
- Eating lots of foods high in fat and sugar
- Having a sedentary lifestyle (little or no physical activity)

Health problems
- Increases your blood pressure and raises cholesterol levels – this puts you at higher risk of coronary heart disease
- Greater risk of developing type 2 diabetes
- Breathing difficulties, tiredness and low self-esteem are all common

Anaemia – can be caused by an Iron Deficiency

What is it?
Iron is needed to make red blood cells – these cells carry oxygen from the lungs and travel in your blood around your body. People with anaemia have a reduced amount of blood cells.

Causes
- Not eating enough iron-rich foods
- Women lose iron during their periods
- Pregnant women lose iron to their baby during pregnancy

Health problems
Tiredness, pale complexion, heart palpitations, headaches, abnormal fingernails

Coronary Heart Disease (CHD)

What is it?
Your cardiovascular system consists of your heart and blood vessels. CHD is when coronary arteries (which supply the heart with blood fill of oxygen) are narrowed because they are filled with fatty deposits.

Causes
- Eating lots of saturated fats
- Being physically inactive – exercise keeps the heart and cardiovascular system healthy
- Smoking – this damages the lining of arteries
- High blood pressure

Health problems
- Chest pains (angina)
- Blood clots can form which suddenly block flow to the heart, the heart doesn't get enough oxygen which can cause a heart attacked (which can be fatal)

Dietary related health problems

Too much sugar can cause:
1. Weight gain (which can lead to obesity)
2. Tooth decay
3. Diabetes (your body cannot produce enough/any insulin to regulate your blood sugar levels)

Too much salt can cause:
1. High blood pressure (this can increase your risk of heart disease and a stroke).

Too much saturated fat can cause:
1. Weight gain (which can lead to obesity)
2. Raise cholesterol (this narrows arteries making it harder for the blood to travel around, putting you at risk of heart disease).

Skeletal issues

Rickets -Soft and weak bones, this occurs in children with a calcium or vitamin D deficiency. Can cause pain in the bones.

Osteoporosis - It is a bone disease that weakens bones and makes them brittle, increasing the chance of them breaking from simply falls.

Tooth decay - Plaque is a sticky substance that contains lots of bacteria. It builds up on your teeth over time. Bacteria feeds on sugars and create acids that can destroy tooth enamel and cause tooth decay.

Example exam questions:
Explain three causes of obesity (6 marks)
What is the function of sugary and starchy carbohydrates (2 marks)
Why is protein especially important for children? (2 marks)
What are the functions of fat? (3 marks)
List 5 food sources of plant based protein (5 marks)

How does starch thicken a sauce (2 marks)
Give an example of fruit that turns brown due to enzyme browning (1 mark)
Which is the best type of flour to use when bread making and why. (3 marks)

Food Science

Starch gelatinisation

The starch particles absorb the liquid and swell when heated. The starch granules burst open and release their starch into the liquid. This causes the liquid to thicken. The more starch, the thicker the liquid.

Enzyme Browning

Enzymes in fruit cause then to ripen. When you slice fruits, the oxygen in the air turns the fruit brown. Enzymes in the fruit speed up this process. E.g. apples and pears.

Shortening

Shortening gives foods a crumbly texture. When you rub butter into flour you cover the flour particles with fat, this gives the flour a waterproof coating. This prevents the long gluten molecules from forming when the liquid is added to the flour. This means the dough cannot become stretchy and baked goods like shortbread keep a 'short' (firm and crumbly) hence the name shortening.

Bread making

Ingredient	Function
Strong white bread flour	High in gluten to give the bread structure. Bulking ingredient of the dough.
Salt	Gives flavour.
Sugar	Food for the yeast so it can multiply quickly.
Yeast	When given food (sugar) and warmth and moisture (water) it ferments producing co2 and alcohol which helps the dough rise and become light and fluffy.
Warm water	This activates the yeast so it can start to ferment.

The Eatwell guide

The Eatwell guide

The Eatwell guide is a government guide designed to show you the proportions of different foods groups you should eat over a day or more.

Tips on making healthy choices from the eatwell guide:

Fruit and vegetables: eat 5 portions of fruit and vegetables a day, this should make up 1/3 of your plate a day, fresh, frozen, canned, dried and fruit juice/smoothies all count, don't exceed 150ml of fruit juice/smoothie a day as it can cause tooth decay, try snacking on fruit over high sugar and fat foods,

Potatoes, bread, rice, pasta and other starchy carbohydrates: choose non-sugary cereals, leave the skin on potatoes, choose wholemeal options of foods such as bread, rice and pasta.

Oils and spreads: choose unsaturated fats such as vegetable oils and margarine over butter, use in small amounts.

Dairy and alternatives: choose lower fat options such as skimmed milk and low fat and salt cheese, choose low sugar yogurts and add fruit as a natural sweetener.

Beans, pulses, fish, eggs, meat and other proteins: eat more beans and pulses as they are high in fibre and fill you up for longer, cut the visible fat off meat, choose lower fat meat options, eat 2 portions of fish a week.

Water: drink 2-3 litres of water a day, choose lower sugar option drinks.

8 Guidelines for Healthy Eating

1. Base your meals on starchy carbohydrates	• This should make up 1/3 of your diet • Chose high fibre, whole grain options e.g. pasta, rice • Try to include one starchy food with each meal	5. Eat less salt – no more than 6g a day for adults	• Eating too much salt can raise blood pressure, this puts you at high risk of heart disease or a stroke • Most of the salt you eat is already in food, check the labels to help you choose low salt options
2. Eat lots of fruit and vegetables	• Try adding a banana to cereal or swap crisps for fruit • Always serve main meals with two vegetables • Beans and pulses can count as 1 of your 5 portions	6. Get active and be a healthy weight	• Regular exercise can reduce your risk of getting serious health conditions • Aim for 150 minutes of exercise a week
3. Eat more fish – including one portion of oily fish	• Fish is a source of protein and vitamins and minerals • It contains omega 3 (good for eyes, skin, brain heart) • Oily fish includes: salmon, herring, mackerel, sardines	7. Don't get thirsty	• 6-8 cups a day, 2-3 litres • Avoid sugary and fizzy drinks as they're bad for teeth • Remember fruit juice and smoothies is also high in sugar
4. Cut down on saturated fat and sugar	• All types of fat are high in energy and should be eaten in small amounts • Excess sugar can cause weight gain and tooth decay	8. Don't skip breakfast	• Kick starts you for the day • choose healthy low fat, sugar and salt and high fibre • Choose low sugar cereals and granola

Food Packaging

Food packaging
Food is packaged to protect the product during transport and whilst sitting on shelves.

Why is food labelling important?
Symbols on packaging show important information to customers.

Giving farmers a fair price for their products.	Forest Stewardship Council – helping effectively manage forests.	Suitable for home freezing.	Eggs have been produced to the highest standards of food safety.	Vegetarian approved – free from animal products.
This product can be recycled.	A British organisation that promotes and regulates food quality.	Tidy man – do not litter.	Food which abides by the Islamic law. The Islamic way of slaughtering is cutting the throat and draining the blood.	An ethical food label – helping farm animals have a good life.

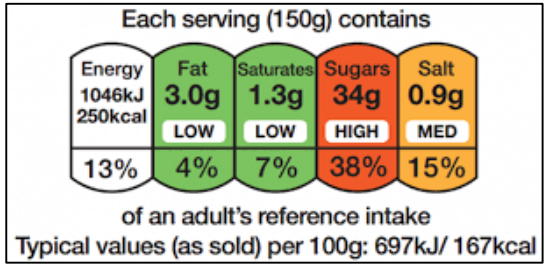
Example exam questions:
Seasonal produce and air miles
What are the advantage of buying locally produced, seasonal produce? (6 marks)
Explain the disadvantages of buying imported foods. (10 marks)
Explain the term 'air miles' (3 marks)
Explain the term 'seasonal produce' (3 marks)
How might a restaurant use the fact they only use

Food packaging
Compare the two dishes and explain which dish is a healthier choice. Use the traffic light system to help you with your answer (6 marks).
Why is it important to include a vegetarian symbol on food packaging of vegetarian products? (2 marks)

Reference intake

You'll see reference intakes referred to on food labels. They show you the maximum amount of calories and nutrients you should eat in a day. Most packaging has a colour coded label on the front to help you make healthy choices.

Reference in take amounts:
Kcal (calories) – 2000
Total Fat -70g
Saturated fat – 20g
Sugar – 90g
Salt – less that 6g



Red means HIGH in that nutrient
Amber means MEDIUM in that nutrient
Green means LOW in that nutrient

Reference intakes are not meant to be targets. They just give you a rough idea of how much energy you should be eating each day, and how much fat, sugar, salt and so on.
The percentages represent how much of your reference intake is in the product, e.g. the product has 3.0g of FAT in it, that is 4% of 70g of fat.

Brownies

Ingredients

100g butter

110g dark chocolate (and extra chocolate chunks to go into the mix)

2 eggs

75g Sugar

50g muscovado sugar

75g plain flour

Equipment

Saucepan, metal bowl, spoon, jug, weighing scales, baking tin

Skills

Melting, using a bain-marie, mixing, baking

Method

1. Place margarine, muscovado sugar and chocolate in the bowl and place on top of sauce pan with water.
2. Leave until melted and stir well.
3. In a separate bowl, mix eggs and caster sugar well.
4. Stir in the chocolate mix.
5. Add the flour and mix until all the flour is combined.
6. Add mixture to a greased baking tray
7. Bake in the oven 30-35min.
8. Remove from oven and cut into 8 pieces.

Pizzas

Ingredients (makes 12)

- 200g strong white flour
- 50g ground semolina (or use 50g extra flour)
- 1tsp salt
- ½ tps sugar
- 170ml warm water

- 4tbsp tomato passata
- Grated cheese
- Toppings of your choice: 2 meat and 3 veg

Equipment

Knife, chopping board, wooden spoon, bowl, jug, grater, rolling pin, cookie cutter

Skills: Rich yeast dough, kneading, baking, grating, shaping,

1. Pre-heat the oven to 200°CWeigh flour and add to a bowl, add yeast and salt and sugar.
2. Create a well in the middle of the flour and add the oil, then gradually add the warm water and mix **(make sure not to add all at once or the dough will be too wet)**
3. When smooth, work the dough on the worktop until elastic and smooth, set aside to rise while preparing the filling.
4. Wash, peel, slice your vegetables, grate the cheese.
5. If using any meat – prepare that too.
6. When all is prepared, roll out the dough thinly on a baking tray.
7. Use a cookie cutter to cut out circle. Place in an oiled cup cake tray.
8. Add the tomato sauce, toppings and cheese.
9. Bake until crispy (20min)

Lasagne

Ingredients

6 Lasagne sheets
Sprinkle of cheese for the top
1 tomato

For the Filling

250-500g Mince Meat
1 onion
1 tin of tomatoes
Salt, pepper, herbs

For the Sauce

30g butter
30g flour
300 ml Milk
60g Cheese

Equipment

Chopping board
Knife
Jug
Grater
Whisk
Wooden spoon
Frying pan
Sauce pan

Skills

Frying
Making a white sauce

1. Chop onion and garlic
2. Start frying the onion and garlic add the meat.
3. When meat is cooked, add the tomatoes and simmer until thickened, add seasoning
4. Making the sauce: in the saucepan melt the butter and flour.
5. When melted switch of the heat and add the milk, little at a time then mixing in.
6. When ALL the milk is mixed in then switch the heat on and constantly whisk until its thickened (boiling point). Switch off and stir through the cheese.
7. **CONSTRUCTION – ½ mince, pasta, ½ cheese sauce. Repeat: ½ mince, pasta, ½ cheese sauce.**
8. Add your remaining grated cheese on top and a sliced tomato.
9. Bake for 40 minutes.

Warming up and cooling down

Components of a warm up:

- Pulse raiser
- Stretches
- Skill related

5 reasons why we must warm-up

1.) Increases the temperature of the muscles, tendons and ligaments, which reduces the chances of injury.
2.) Increases heart rate and body temperature safely, which reduces chances of injury.
3.) Increases flexibility, which aids flexibility.
4.) Mentally prepares you for exercise, which can help improve performance.
5.) Increases oxygen delivery to the working muscles, which supports performance

6 reasons why we must cool down

1.) Gradually returns body temperature, breathing and heart back to their resting rate.
2.) To mentally unwind.
3.) To remove lactic acid, helping to prevent **DOMS** (Delayed Onset Muscle Soreness)
4.) To remove carbon dioxide and waste products.
5.) Improves flexibility
6.) Avoids blood from gathering in muscles (pooling), which can cause dizziness

DID YOU KNOW…?

The recommended safe heart rate for an individual during exercise is called your **Maximum Heart Rate (HR max)**. To estimate your HR max you need the following formula: **MAXIMUM HEART RATE = 220 – Your AGE**. For example, if you are 20 Years old your HR max would be 220 – 20 = 200 beats per minute (bpm)

Components of Physical Fitness

Aerobic Endurance

The ability of the heart and lungs to work hard to supply nutrients and oxygen to the muscles during exercise.

Muscular Endurance

The ability of the muscles to work efficiently for long periods of time

Speed

The ability to cover a distance quickly. There are 3 types of speed (Accelerative speed, Pure speed and Speed Endurance.

Muscular Strength

The maximum force, measured in kilograms (Kg) or newtons (N) that can be generated by a muscle or group of muscles.

Flexibility

The range of motion in all joints of the body and the ability to move a joint fluidly through its complete range of movement.

Body Composition

The amount of fat to fat-free muscle mass.

Components of Skill-related Fitness

Agility

The ability of a sports performer to quickly change direction without losing balance or time

Balance

The ability to maintain your centre of mass over a base of support. There are two forms of balance (static which is maintaining balance in a stationary position and Dynamic which is maintaining balance while in motion)

Co-ordination

The ability of the body to work together to move smoothly and accurately

Power

The ability to use strength and speed. It is the work done in a unit of time and is calculated in the following way Power = Force (Kg) x Distance (m) / time (mins or seconds)

Reaction time

The time taken for a sports performer to respond to a stimulus, for example, the time taken for a sprinter to react to the starter gun.

Principles of training

F Frequency – How often you train

I Intensity – How hard you train

T Time – How long you train

T Type – How specific your training is

Exercise intensity: The Borg scale

(RPE – Rating of Perceived Exertion)

This scale measures how hard performers think they are working.

It can also be used to measure Heart Rate and training zones.

(RPE x 10 = Heart Rate)

RPE	Intensity
6	No exertion
7	
8	
9	
10	
11	Light exertion
12	
13	Somewhat hard
14	
15	Hard (Heavy)
16	
17	Very Hard
18	
19	
20	Maximal Exertion

S Specificity

P Progressive Overload

A Adaptability

R Reversibility

V Variation

I Individual Needs

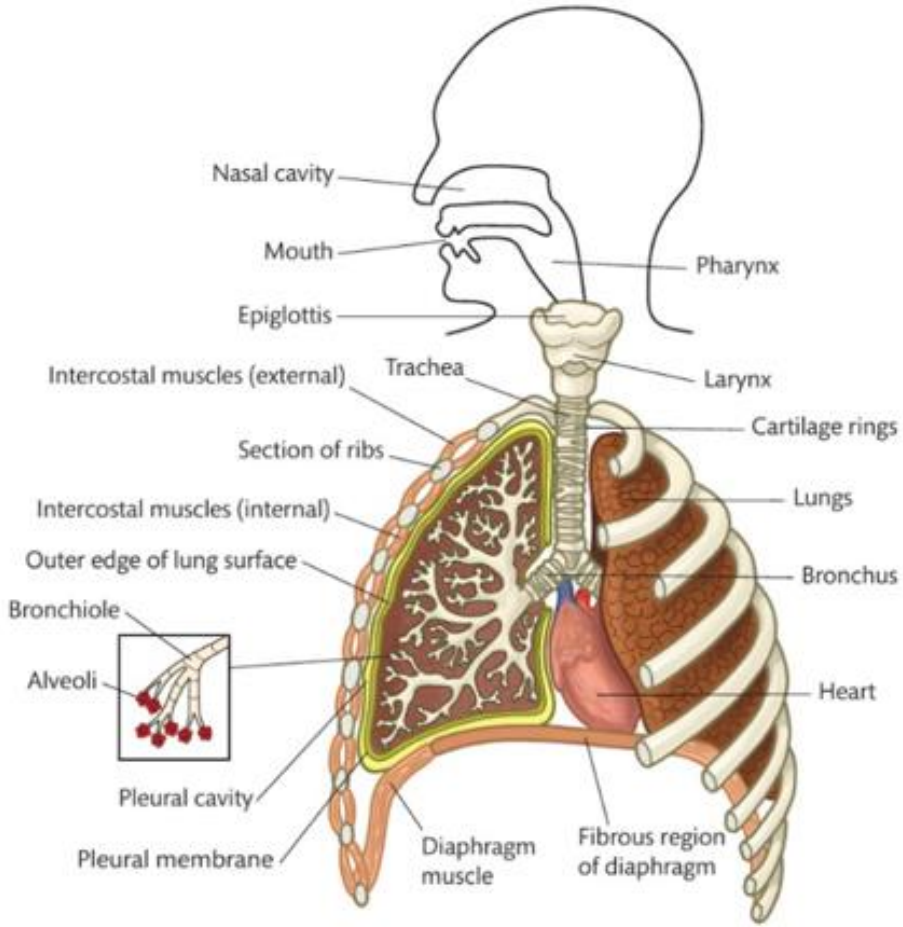
R&R Rest and Recovery

Methods of training

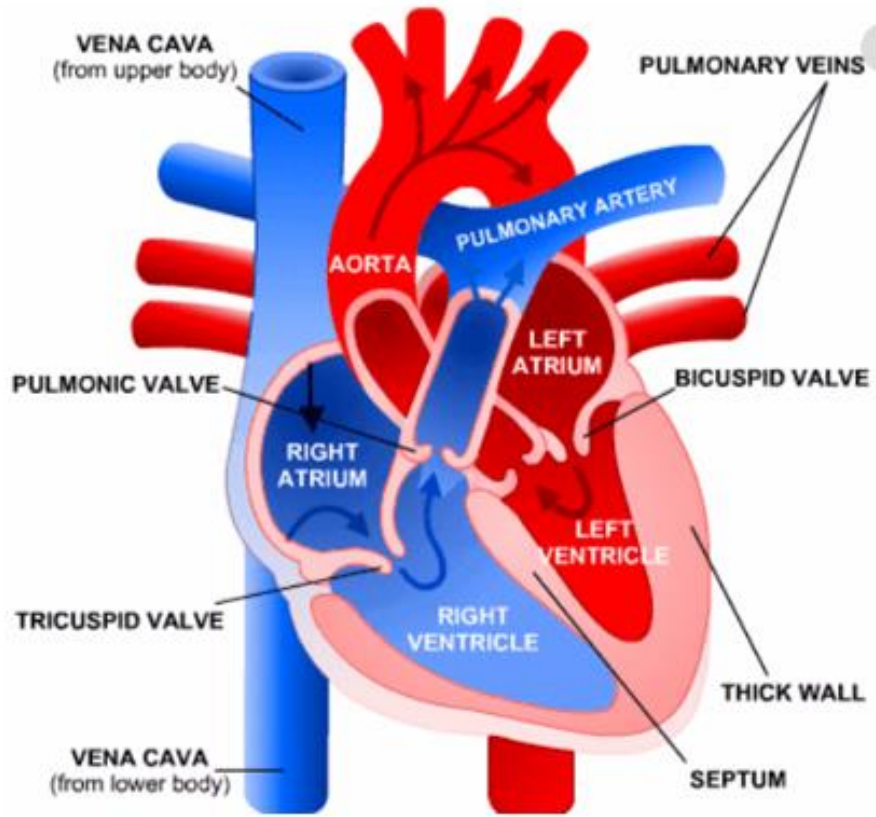
Circuit training – This involves a number of different activities that can be sport-specific or tailored to help improve certain levels of fitness.
Continuous training – This is training at a steady pace, moderate intensity to develop aerobic endurance. At least 30 minutes of steady running is an example of continuous training.
Fartlek training – This is a form of continuous training but the intensity is changed by running at different speeds over different terrains.
Interval training – This method requires periods of exercise followed by rest and recovery periods.
Plyometric training – This training develops sport-specific explosive power and strength.
Flexibility training – The method to develop flexibility at a joint. This is conduction using stretching. The three stretching categories are Static, Ballistic and Proprioceptive Neuromuscular Facilitation (PNF)
Speed training – Speed training can take many forms and can be sport specific. The three types of sprints are Acceleration, Interval and Hollow sprints.
Weight training – Weight training is a form of interval training and involves using reps and sets of reps.

Can you try these exercises at home? They are easy, free and works wonders for your core!

The respiratory system



The cardiovascular system



AQA Combined Science: **Physics Topic 5 Forces**

Scalar and Vector Quantities

A scalar quantity has magnitude only. Examples include temperature or mass.

A vector quantity has both magnitude and direction. Examples include velocity.

Speed is the scalar magnitude of velocity.

A vector quantity can be shown using an arrow. The size of the arrow is relative to the magnitude of the quantity and the direction shows the associated direction.

Contact and Non-Contact Forces

Forces either push or pull on an object. This is as a result of its interaction with another object.

Forces are categorised into two groups:

Contact forces – the objects are touching e.g. friction, air resistance, tension and contact force.

Non-contact forces – the objects are not touching e.g. gravitational, electrostatic and magnetic forces.

Forces are calculated by the equation: force (N) = mass (kg) × acceleration (m/s^2)

Forces are another example of a vector quantity and so they can also be represented by an arrow.

Gravity

Gravity is the natural phenomenon by which any object with mass or energy is drawn together.

- The mass of an object is a scalar measure of how much matter the object is made up of. Mass is measured in kilograms (kg).
- The weight of an object is a vector measure of how gravity is acting on the mass. Weight is measured in newtons (N).

weight (N) = mass (kg) × gravitational field strength (N/kg)

(The gravitational field strength will be given for any calculations. On earth, it is approximately 9.8N/kg).

An object's centre of mass is the point at which the weight of the object is considered to be acting. It does not necessarily occur at the centre of the object.

The mass of an object and its weight are directly proportional. As the mass is increased, so is the weight. Weight is measured using a spring-balance (or newton metre) and is measured in newtons (N).

Resultant Forces

A resultant force is a single force which replaces several other forces. It has the same effect acting on the object as the combination of the other forces it has replaced.

The forces acting on this object are represented in a free body diagram. The arrows are relative to the magnitude and direction of the force.

The car is being pushed to the left by a force of 30N. It is also being pushed to the right by a force of 50N.

The resultant force is 50N – 30N = 20N

The 20N resultant force is pushing to the right, so the car will move right.

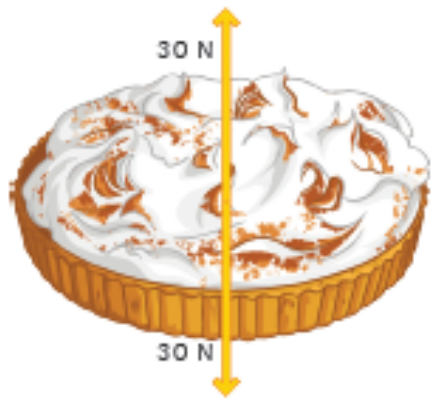
When a resultant force is not zero, an object will change speed (accelerate or decelerate) or change direction (or both).

When an object is stationary, there are still forces acting upon it.

In this case, the resultant force is 30N – 30N = 0N.

The forces are in equilibrium and are balanced.

When forces are balanced, an object will either remain stationary or if it is moving, it will continue to move at a constant speed.

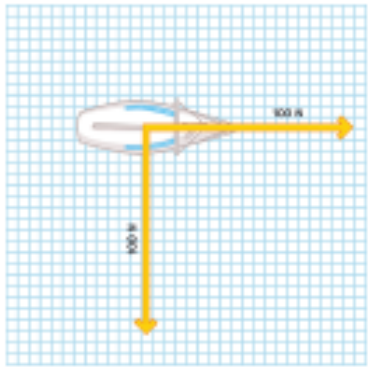


Resultant Forces

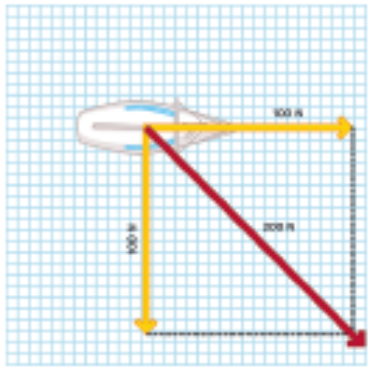
A scale vector diagram can be used to calculate resultant forces that are not acting directly opposite of one another, on a straight line.

Worked example 1:

A boat is being pulled toward the harbour by two winch motors. Each motor is pulling with a force of 100N and they are working at right angles to one another.



To find the resultant force, you would first draw construction lines from the end of each arrow parallel to the other force arrow.



Remember that the size of the arrow is representative of the size of the force being exerted.

Where the construction lines intercept indicates the direction of the resultant force: from the centre of mass through the intercept.

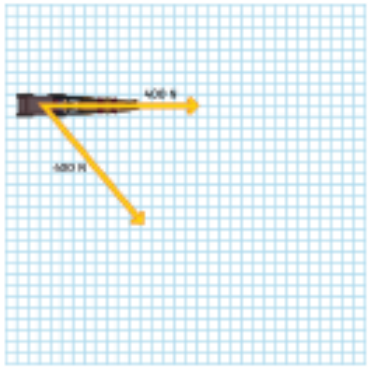
The resultant force is the sum of the forces acting so in this example, that is 200N.

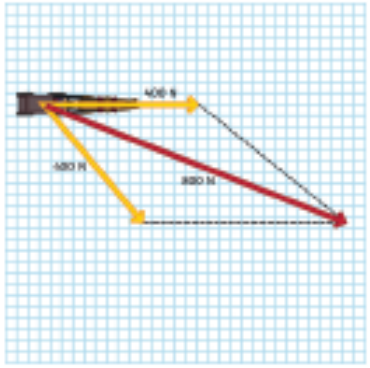
Measure the size of the arrows and make sure you draw your resultant force arrow to the correct scale so it represents the resultant force size.

Worked example 2:

A horse-drawn carriage is pulled by two horses at 400N each. One of the horses is pulling in a different direction to the other horse. Show the resultant force and direction of the horse-drawn carriage.

As before, you will need to draw construction lines from the end of each force arrow and parallel to the other one. The intercept represents the direction of the resultant force. The resultant force is the sum of the individual forces so in this example, it is 800N.





Work Done and Energy Transfer

When a force acts on an object and makes it move, there is work done on the object. This movement requires energy. The input energy could be from fuel, food or electricity for example.

The energy is transferred to a different type of energy when the work is done. Not all the energy transfers are useful, sometimes energy is wasted. For example, when car brakes are applied, some energy is wastefully transferred as heat to the surroundings. Work done against the force of friction always causes a temperature rise in the object.

Work done is calculated by this equation:

work done (*energy transferred*) (J) = force (N) × distance moved (in the direction of the force) (m)

Worked example

A man's car has broken down and he is pushing it to the side of the road. He pushes the car with a force of 160N and the car is moved a total of 8m. Calculate the energy transferred.

E = F × d

E = 160 × 8

E = 1280J

1 joule of energy is transferred for every 1 newton of force moving an object by a distance of 1 metre.

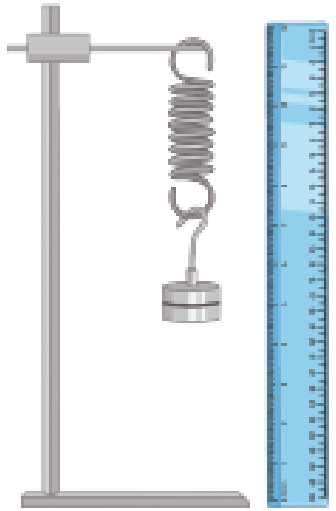
1J = 1Nm

Required Practical Investigation Activity 6: Investigate the Relationship Between Force and Extension for a Spring

$F = k \times e$

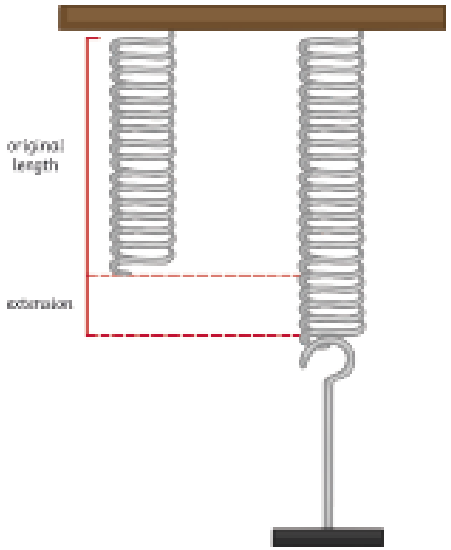
force applied (N) = spring constant (N/m) × extension (m)

You should be familiar with the equation above and the required practical shown to the right.



The spring constant is a value which describes the elasticity of a material. It is specific to each material. You can carry out a practical investigation and use your results to find the spring constant of a material.

1. Set up the equipment as shown.
2. Measure the original length of the elastic object, e.g. a spring, and record this.
3. Attach a mass hanger (remember the hanger itself has a weight). Record the new length of the spring.
4. Continue to add masses to the hanger in regular intervals and record the length each time.

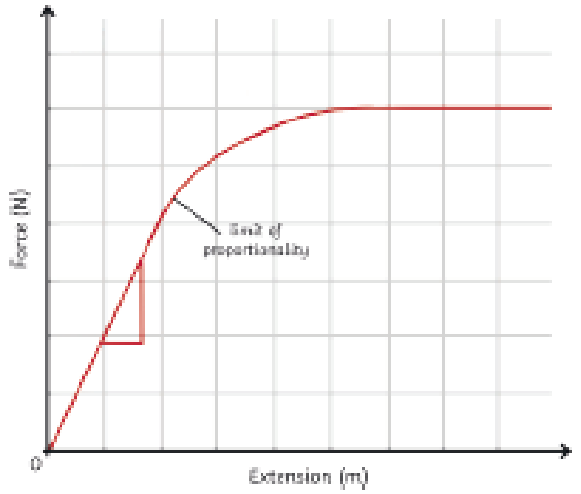


Once you have your results, you can find the extension for each mass using this formula: spring length – original length

The data collected is continuous so you would plot a line graph using the *x*-axis for extension (m) and the *y*-axis for force (N). As a result of Hooke's Law, you should have a linear graph. The gradient of the graph is equal to the spring constant. You can calculate it by rearranging the formula above or by calculating the gradient from your graph.

Spring Constant and Hooke's Law

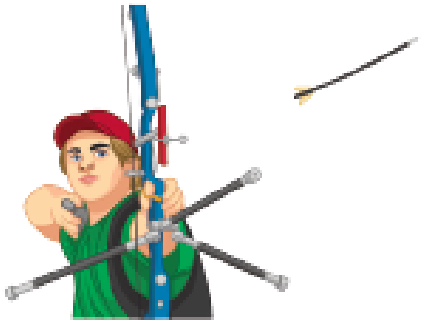
Hooke's Law describes that the extension of an elastic object is proportional to the force applied to the object. However, there is a maximum applied force for which the extension will still increase proportionally. If the limit of proportionality is exceeded, then the object becomes permanently deformed and can no longer return to its original shape. This can be identified on a graph of extension against force when the gradient stops being linear (a straight line) and begins to plateau. The limit is shown on the graph above and this is the specific object's elastic limit.



Forces and Elasticity

When work is done on an elastic object, such as a spring, the energy is stored as elastic potential energy.

When the force is applied, the object changes shape and stretches. The energy is stored as elastic potential and when the force is no longer applied, the object returns to its original shape. The stored elastic potential energy is transferred as kinetic energy and the object recoils and goes back to its original shape.



Work Done: Elastic Objects

Work is done on elastic objects to stretch or compress them.

To calculate the work done (elastic potential energy transferred), use this equation:

$E\ (J) = 0.5 \times k \times e^2$

(elastic potential energy = 0.5 × spring constant × extension^2)

You might need to use this equation also: $F = k \times e$

Worked example:

A bungee jumper jumps from a bridge with a weight of 800N. The elastic cord is stretched by 25m. Calculate the work done.

Step 1: find the spring constant using $F = k \times e$

Rearrange to $k = F \div e$

$800 \div 25 = 32N/m$

Step 2: use the value for k to find the elastic potential energy (work done) using $E\ (J) = 0.5 \times k \times e^2$

$0.5 \times 32 \times 25^2$

$E = 10\ 000J$

Velocity

Velocity is a vector quantity. It is the speed of an object in a given direction.

Circular Motion (Higher tier only)

Objects moving in a circular path don't go off in a straight line because of a centripetal force caused by another force acting on the object.

For example, a car driving around a corner has a centripetal force caused by friction acting between the surface of the road and the tyres. When the Earth orbits around the Sun, it is held in orbit by gravity which causes the centripetal force.

When an object is moving in a circular motion, its speed is constant. Its direction changes constantly and because direction is related to velocity, this means that the velocity of the object is constantly changing too. The changes in velocity mean that the object is accelerating, even though it travels at a constant speed.

The acceleration occurs because there is a resultant force acting on the object. In this case, the resultant force is the velocity, which is greater than the centripetal force acting.

Forces and Motion: Distance vs Displacement

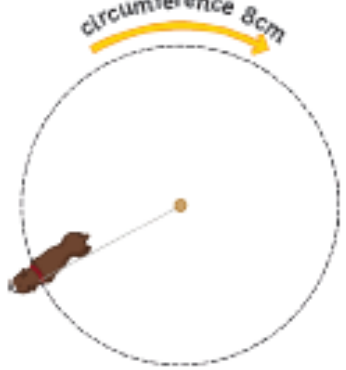
Distance is a scalar quantity. It measures how far something has moved and does not have any associated direction.

Displacement is a vector quantity. It measures how far something has moved and is measured in relation to the direction of a straight line between the starting and end points.

E.g. A dog is tethered to a post. It runs 360° around the post three times. Each 360° lap is 8m

distance = 8 × 3 = 24m

displacement = 0m (The dog is in the same position as when it started.)



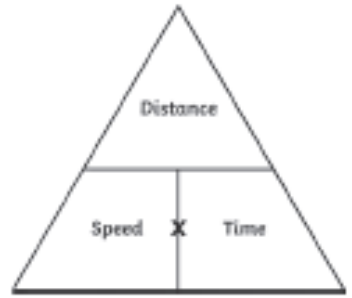
Speed

You should be able to recall the typical speed of different transportation methods.

Activity	Typical Value
walking	1.5m/s
running	3m/s
cycling	6m/s
driving a car	25mph (40km/h)
train travel	60mph (95km/h)
aeroplane travel	550mph (885km/h)
speed of sound	*330m/s*

These values are average only. The speed of a moving object is rarely constant and always fluctuating.

speed = distance ÷ time



You should be able to use this equation and rearrange it to find the distance or time.

Worked example:

John runs 5km. It takes him 25 minutes. Find his average speed in metres per second.

Step 1: convert the units

km → m (×1000) = 5000m

min → s (×60) = 1500s

Step 2: calculate s = d ÷ t

s = 5000 ÷ 1500

s = 3.33m/s

Worked example 2:

Zi Xin has driven along the motorway. Her average speed is 65mph. She has travelled 15 miles. How long has her journey taken? Give your answer in minutes.

Step 1: calculate t = d ÷ s

t = 15 ÷ 65

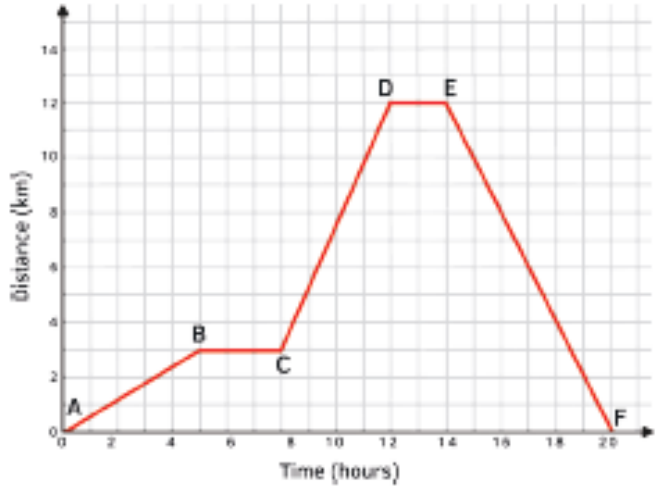
t = 0.23 (hours)

Step 2: convert units

hr → min (×60) = 13.8 minutes

Distance-Time and Velocity-Time Graphs

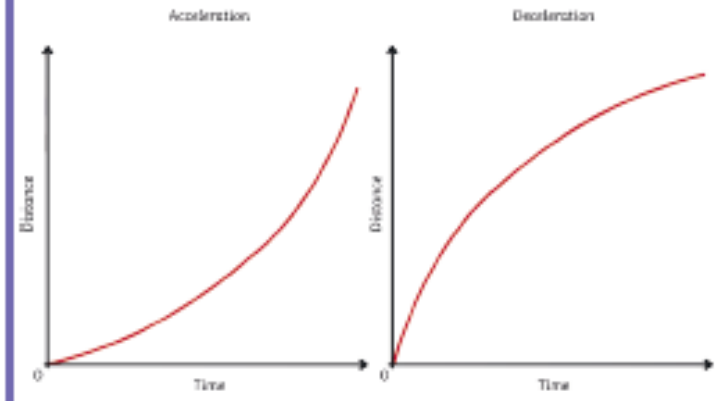
When an object travels in a straight line, we can show the distance which has been covered in a distance-time graph.



You should be able to understand what the features of the two types of graph can tell you about the motion of an object.

Graph Feature	Distance-Time Graph	Velocity-Time Graph
x-axis	time	time
y-axis	distance	velocity
gradient	speed	acceleration (or deceleration)
plateau	stationary (stopped)	constant speed
uphill straight line	steady speed moving away from start point	acceleration
downhill straight line	steady speed returning to the start point	deceleration
uphill curve	acceleration	increasing acceleration
downhill curve	deceleration	increasing deceleration
area below graph		distance travelled

Changing Speed on a D-T Graph



When the graph is a straight line, it is representing a constant speed. A curve represents a changing speed, either acceleration or deceleration. The speed at any given point can be calculated by drawing a tangent from the curve and finding the gradient of the tangent.

Terminal Velocity

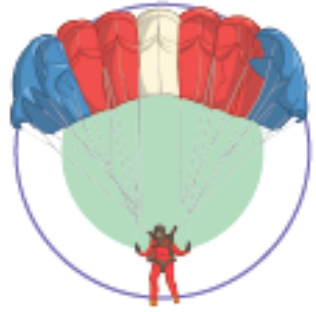
When an object begins moving, the force accelerating the object is much greater than the force resisting the movement. A resistant force might be air resistance or friction, for example.

As the velocity of the object increases, the force resisting the movement also increases. This causes the acceleration of the object to be reduced gradually until the forces become equal and are balanced. This doesn't cause the object to stop moving. As the object is already in motion, balanced forces mean it will continue to move at a steady speed. This steady speed is the maximum that the object can achieve and is called the terminal velocity.

The terminal velocity of an object depends on its shape and weight. The shape of the object determines the amount of resistant force which can act on it. For example, an object with a large surface area will have a greater amount of resistance acting on it.

Consider a skydiver and his parachute. When the skydiver first jumps from the aeroplane, he has a small area where the air resistance can act. He will fall until he reaches a terminal velocity of approximately 120mph.

After the skydiver releases his parachute, the shape and area has been changed and so the amount of air resistance acting is increased. This causes him to decelerate and his terminal velocity is reduced to about 15mph. This makes it a much safer speed to land on the ground.



Acceleration

Acceleration can be calculated using the equation:

$$\text{acceleration (m/s}^2\text{)} = \frac{\text{change in velocity (m/s)}}{\text{time taken (s)}}$$

Worked example:

A dog is sitting, waiting for a stick to be thrown. After the stick is thrown, the dog is running at a speed of 4m/s. It has taken the dog 16s to reach this velocity. Calculate the acceleration of the dog.

$a = \Delta v \div t$

$a = (4-0) \div 16$

$A = 0.25 m/s^2$

Changes in velocity due to acceleration can be calculated using the equation below. This equation of motion can be applied to any moving object which is travelling in a straight line with a uniform acceleration.

Final velocity^2 (m/s) – initial velocity^2 (m/s) = 2 × acceleration (m/s^2) × displacement (m)

or

$v^2 - u^2 = 2as$

Worked example:

A bus has an initial velocity of 2m/s and accelerates at 1.5m/s^2 over a distance of 50m. Calculate the final velocity of the bus.

Step 1: rearrange the equation: $v^2 - u^2 = 2as$

$v^2 = 2as + u^2$

Step 2: insert known values and solve

$v^2 = (2 \times 1.5 \times 50) + 2^2$

$v^2 = (150) + 4$

$v^2 = 154$

$v = \sqrt{154}$

$v = 12.41 m/s$

Braking Distance

The braking distance is the distance travelled by a vehicle once the brakes are applied and until it reaches a full stop.

Braking distance is affected by:

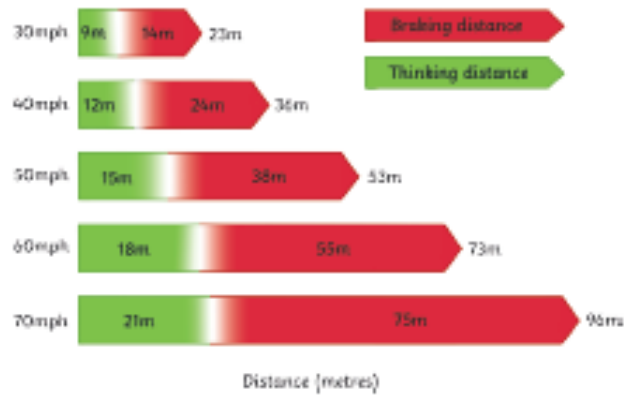
- adverse weather conditions (wet or icy)
- poor vehicle condition (brakes or tyres)

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

The work done reduces the kinetic energy and it is transferred as heat energy, increasing the temperature of the brakes.

increased speed = increased force required to stop the vehicle

increased braking force = increased deceleration

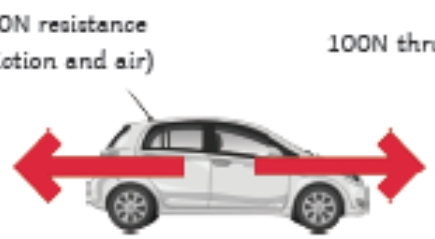


Large decelerations can cause a huge increase in temperature and may lead to the brakes overheating and the driver losing control over the vehicle

Newton's Laws of Motion: Newton's First Law

If the resultant force acting on an object is zero...

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



Inertia – the tendency of an object to continue in a state of rest or uniform motion (same speed and direction).

Newton's Laws of Motion: Newton's Second Law

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

resultant force (N) = mass (kg) × acceleration (m/s^2)

Inertial mass – how difficult it is to change an objects velocity. It is defined as the ratio of force over acceleration.

Newton's Laws of Motion: Newton's Third Law

When two objects interact, the forces acting on one another are always equal and opposite.

For example, a book laid on a table is being acted upon by at least two forces: the downward pull of gravity and the upward reaction force from the table surface. The forces are equal and opposite so the book does not move. We describe the forces as being balanced.

Stopping Distance

The stopping distance of a vehicle is calculated by:

stopping distance = thinking distance + braking distance

Reaction time is the time taken for the driver to respond to a hazard. It varies from 0.2s to 0.9s between most people.

Reaction time is affected by:

- tiredness
- drugs
- alcohol
- distractions

You can measure human reaction time in the lab using simple equipment: a metre ruler and stopwatch can be used to see how quickly a person reacts and catches the metre ruler. The data collected is quantitative and you should collect repeat readings and calculate an average result.

Momentum

momentum (N) = mass (kg) × velocity (m/s)

The law of conservation of mass (in a closed system) states that the total momentum before an event is equal to the total momentum after an event.

Worked example:

Calculate the momentum of a 85kg cyclist travelling at 7m/s.

$p = m \times v$

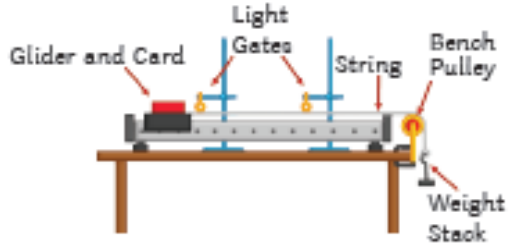
$p = 85kg \times 7m/s$

$p = 595kg\ m/s$

Required Practical Investigation 7

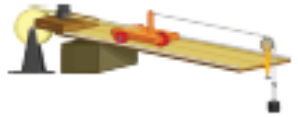
Aim: investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass of an object on the acceleration produced by a constant force.

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



or

or



Something is a fair test when only the independent variable has been allowed to affect the dependent variable.

The independent variable was force.

The dependent variable was acceleration.

The control variables were:

- same total mass
- same surface/glider/string/pulley (friction)
- same gradient if you used a ramp

AQA GCSE Biology (Combined Science) Unit 2: Organisation

Principles of Organisation

cell

Cells are the basic building blocks of all living things.

tissue

A group of cells with a similar structure and function is called a tissue.

organ

An organ is a combination of tissues carrying out a specific function.

organ system

Organs work together within an organ system.

organism

Organ systems work together to form whole living organisms.

Food Tests (Required Practical)

What are you testing for?	Which indicator do you use?	What does a positive result look like?
sugar	Benedict's reagent	Once heated, the solution will change from blue-green to yellow-red.
starch	iodine	Blue-black colour indicates starch is present.
protein	biuret	The solution will change from blue to pink-purple.
lipid	sudan III	The lipids will separate and the top layer will turn bright red.

Effect of pH on the Rate of Reaction of Amylase (Required Practical)

Iodine is used to test for the presence of starch. If starch is present, the colour will change to blue-black.

The independent variable in the investigation is the pH of the buffer solution.

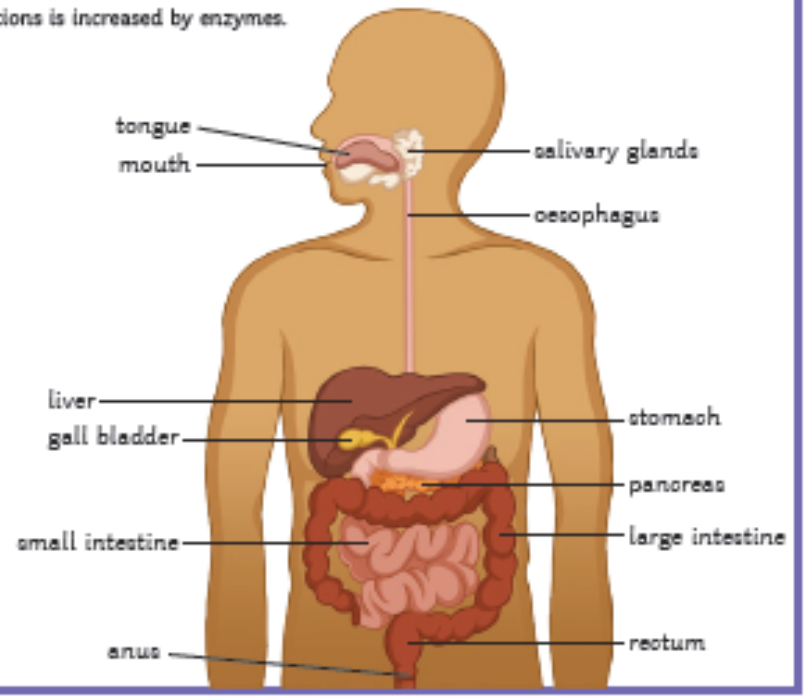
The dependent variable in the investigation is the time taken for the reaction to complete (how long it takes for all the starch to be digested by the amylase).

Method:

1. Use the marker pen to label a test tube with the first value of pH buffer solution (pH 4) and stand it in the test tube rack.
2. Into each well of the spotting tiles, place a drop of iodine.
3. Using a measuring cylinder, measure 2cm³ of amylase and pour into the test tube.
4. Using a syringe, measure 1cm³ of the buffer solution and pour into the test tube.
5. Leave this to stand for five minutes and then use the thermometer to measure the temperature. Make a note of the temperature.
6. Add 2cm³ of starch solution into the test tube, using a different measuring cylinder to measure, and begin a timer (leave the timer to run continuously).
7. After 10 seconds, use a pipette to extract some of the amylase/starch solution, and place one drop into the first well of the spotting tile. Squirt the remaining solution back into the test tube.
8. Continue to place one drop into the next well of the spotting tile, every 10 seconds, until the iodine remains orange.
9. Record the time taken for the starch to be completely digested by the amylase by counting the wells that were tested positive for starch (indicated by the blue/black colour change of the iodine). Each well represents 10 seconds of time.
10. Repeat steps 1 to 8 for pH values 7 and 10.

The Digestive System

The purpose of the digestive system is to break down large molecules into smaller, soluble molecules, which are then absorbed into the bloodstream. The rate of these reactions is increased by enzymes.



AQA GCSE Biology (Combined Science) Unit 2: Organisation

Enzymes

An enzyme is a biological catalyst; enzymes speed up chemical reactions without being changed or used up.

This happens because the enzyme lowers the activation energy required for the reaction to occur. Enzymes are made up of chains of amino acids folded into a globular shape.

Enzymes have an active site which the substrate (reactants) fits into. Enzymes are very specific and will only catalyse one specific reaction. If the reactants are not the complimentary shape, the enzyme will not work for that reaction.

Enzymes also work optimally at specific conditions of pH and temperature. In extremes of pH or temperature, the enzyme will denature. This means that the bonds holding together the 3D shape of the active site will break and the active shape will deform. The substrate will not be able to fit into the active site anymore and the enzyme cannot function.

Enzyme	Reactant	Product
amylase	starch	sugars (glucose)
protease	protein	amino acids
lipase	lipid	glycerol and fatty acids

The products of digestion are used to build new carbohydrates and proteins and some of the glucose is used for respiration.

Bile is produced in the liver and stored in the gall bladder. It is an alkaline substance which neutralises the hydrochloric acid in the stomach. It also works to emulsify fats into small droplets. The fat droplets have a higher surface area and so the rate of their digestion by lipase is increased.

The Heart and Blood Vessels

The heart is a large muscular organ which pumps blood carrying oxygen or waste products around the body. The lungs are the site of gas exchange where oxygen from the air is exchanged for waste carbon dioxide in the blood. Oxygen is used in the respiration reaction to release energy for the cells and carbon dioxide is made as a waste product during the reaction.

glucose + oxygen ⟶ carbon dioxide + water + [energy]

vein | artery | capillary

The three types of blood vessels, shown above, are each adapted to carry out their specific function.

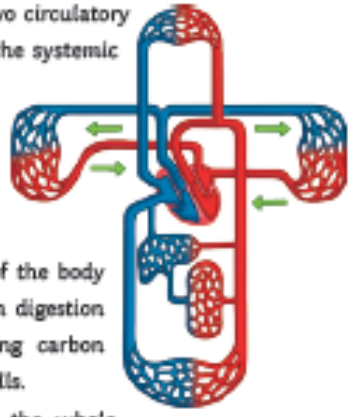
Capillaries are narrow vessels which form networks to closely supply cells and organs between the veins and arteries. The walls of the capillaries are only one cell thick, which provides a short diffusion pathway to increase the rate at which substances are transferred.

The table below compares the structure and function of arteries and veins:

	Artery	Vein
direction of blood flow	away from the heart	towards the heart
oxygenated or deoxygenated blood?	oxygenated (except the pulmonary artery)	deoxygenated (except the pulmonary vein)
pressure	high	low (negative)
wall structure	thick, elastic, muscular, connective tissue for strength	thin, less muscular, less connective tissue
lumen (channel inside the vessel)	narrow	wide (with valves)

The Heart as a Double Pump

The heart works as a double pump for two circulatory systems; the pulmonary circulation and the systemic circulation.



The pulmonary circulation serves the lungs and bring deoxygenated blood to exchange waste carbon dioxide gas for oxygen at the alveoli.

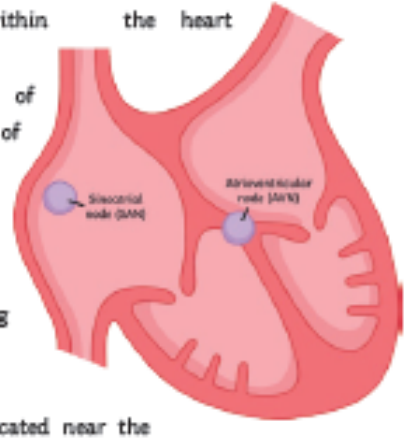
The systemic circulation serves the rest of the body and transports oxygen and nutrients from digestion to the cells of the body, whilst carrying carbon dioxide and other waste away from the cells.

The systemic circulation flows through the whole body. This means the blood is flowing at a much higher pressure than in the pulmonary circuit.

The Heart as Pacemaker

The rate of the heart beating is very carefully, and automatically, controlled within the heart itself.

Located in the muscular walls of the heart are small groups of cells which act as pacemakers. They produce electrical impulses which stimulate the surrounding muscle to contract, squeezing the chambers of the heart and pumping the blood.



The sino-atrial node (SAN) is located near the right atrium and it stimulates the atria to contract.

The atrio-ventricular node (AVN) is located in between the ventricles and stimulates them to contract.

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Artificial pacemakers can be surgically implanted into a person if their heart nodes are not functioning correctly.

Coronary Heart Disease

Coronary heart disease is a condition resulting from blockages in the coronary arteries. These are the main arteries which supply blood to the heart itself and they can become blocked by build-up of fatty deposits.

In the UK and around the world, coronary heart disease is a major cause of many deaths.

The main symptoms can include chest pain, heart attack or heart failure. Yet, not all people suffer the same symptoms, if any at all.
Lifestyle factors can increase the risk of a person developing coronary heart disease.

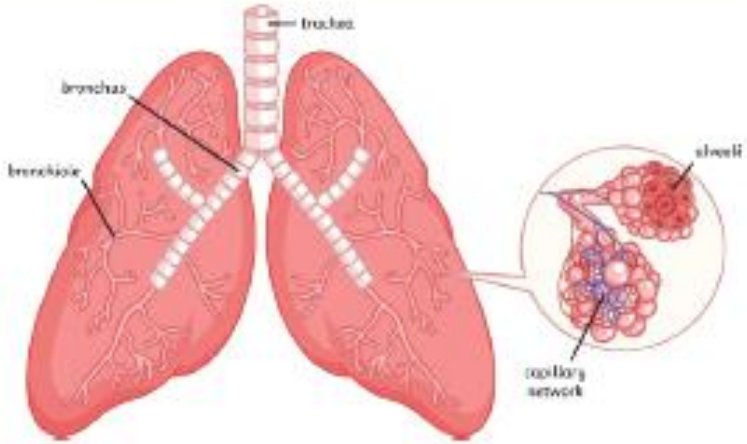
Diet – a high-fat diet (containing lots of saturated fat) can lead to higher cholesterol levels and this cholesterol forms the fatty deposits which damage and block the arteries.

Smoking – chemicals in cigarette smoke, including nicotine and carbon monoxide, increase the risk of heart disease. Carbon monoxide reduces the amount of oxygen which can be transported by the red blood cells and nicotine causes an increased heart rate. The lack of oxygen to the heart and increased pressure can lead to heart attacks.

Stress – prolonged exposure to stress or stressful situations (such as high pressure jobs) can lead to high blood pressure and an increased risk of heart disease.

Drugs – illegal drugs (e.g. ecstasy and cannabis) can lead to increased heart rate and blood pressure, increasing the risk of heart disease.

Alcohol – regularly exceeding unit guidelines for alcohol can lead to increased blood pressure and risk of heart disease.



Blood

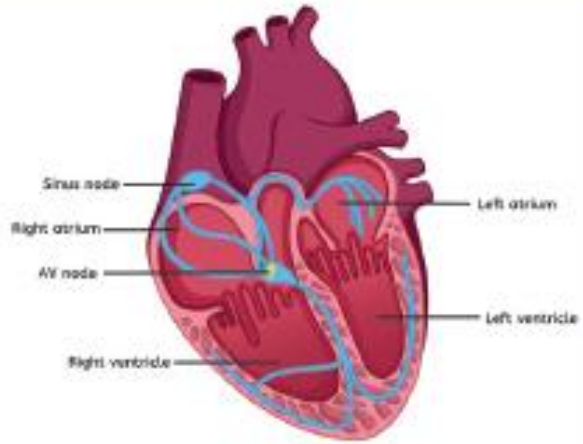
Blood is composed of red blood cells (erythrocytes), white blood cells and platelets, all suspended within a plasma (a tissue).

The plasma transports the different blood cells around the body as well as carbon dioxide, nutrients, urea and hormones. It also distributes the heat throughout the body.

Red blood cells transport oxygen attached to the haem group in their structure. It has a biconcave shape to increase surface area and does not contain a nucleus so it can bind with more oxygen molecules.

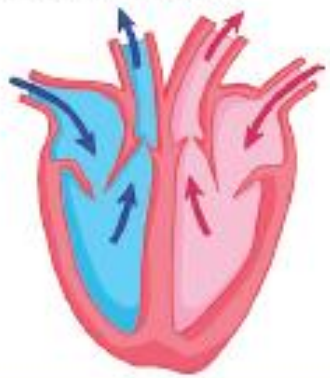
White blood cells form part of the immune system and ingest pathogens and produce antibodies. Platelets are important blood clotting factors.

at the lungs
haemoglobin + oxygen ⇌ oxyhaemoglobin
at the cells



The right atrium receives deoxygenated blood via the vena cava. It is then pumped down through the valves into the right ventricle. From here, it is forced up through the pulmonary artery towards the lungs where it exchanges carbon dioxide for oxygen. The oxygenated blood then enters the left atrium via the pulmonary vein and down into the left ventricle. The muscular wall of the left ventricle is much thicker so it can pump the blood more forcefully out of the heart and around the entire body, via the aorta.

The blood only flows in one direction. This is because there are valves in the heart which close under pressure and prevent the backward flow of blood.



AQA GCSE Biology (Combined Science) Unit 2: Organisation

Rate Calculations for Blood Flow

The number of beats the heart performs each minute is called the pulse (or heart rate).

It is easily measured by counting the number of beats in a given time, e.g. 15s, and finding the total beats per minute.

Typically, a lower resting pulse rate indicates a greater level of physical fitness. During exercise, and for some time after, the pulse rate increases while the heart is working to provide more oxygen to the muscles.

Cardiac output is a measure of the volume of blood pumped by the heart each minute. Stroke volume is a measure of the volume of blood pumped from the heart each contraction (heart beat).

Cardiac output (cm^3/min) = heart rate (bpm) × stroke volume (cm^3/beat)

Cancer

Cancer is the result of uncontrolled cell growth and division. The uncontrolled growth of cells is called a tumour.

Benign Tumour	Malignant Tumour
• Usually grows slowly. • Usually grows within a membrane and can be easily removed. • Does not normally grow back. • Does not spread around the body. • Can cause damage to organs and be life-threatening.	• cancerous • Usually grows rapidly. • Can spread around the body, via the bloodstream. • Cells can break away and cause secondary tumours to grow in other areas of the body (metastasis).

Plant Tissues, Organs and Systems

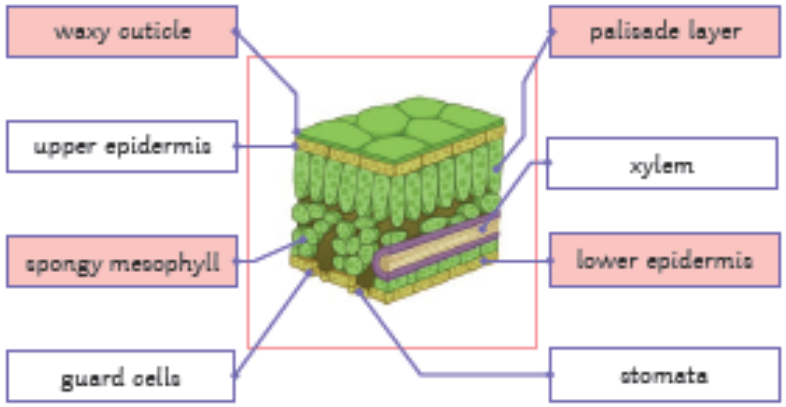
Leaves are plant organs and their main function is to absorb sunlight energy for use in photosynthesis. Within the cells are small organelles called chloroplasts which contain a green pigment called chlorophyll. This is the part of the plant which absorbs the sunlight and where photosynthesis occurs.

$$\text{carbon dioxide + water} \xrightarrow{\text{sunlight}} \text{oxygen + glucose}$$

Leaves are adapted to carry out their function. Leaves are typically flat and thin with a large surface area. This means they have a maximum area to absorb the sunlight and carbon dioxide. The thin shape reduces the distance for diffusion of water and gases.

Leaves contain vessels called xylem and phloem. The xylem transport water and dissolved minerals toward the leaves. The phloem transport glucose and other products from photosynthesis around the plant.

The large air spaces between the cells of the spongy mesophyll layer allow for the diffusion of gases. Carbon dioxide enters the leaves and oxygen exits the leaves.



The guard cells are specially adapted cells located on the underside of the leaf. They are positioned in pairs, surrounding the stomata (a small opening in the epidermis layer). The guard cells change shape to open and close the stomata, controlling the rate of gas exchange in the leaf.

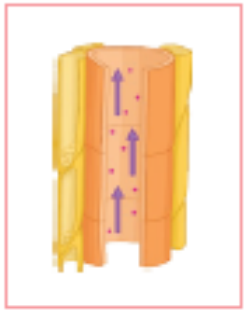
Root Hair Cells

Plants absorb water by osmosis through the root hair cells of the roots. Dissolved in the water are important minerals for the plant's growth and development, which are absorbed by active transport.

The root hair cells are adapted to their function with the following features:

- Finger-like projection in the membrane increases the surface area available for water and minerals to be absorbed across.
- The narrow shape of the projection can squeeze into small spaces between soil particles, bringing it closer and reducing the distance of the diffusion pathway.
- The cell has many mitochondria, which release energy required for the active transport of some substances.

Xylem and Phloem



Xylem vessels transport water through the plant, from roots to leaves. They are made up of dead, lignified cells, which are joined end to end with no walls between them, forming a long central tube down the middle. The movement of the water, and dissolved minerals, along the xylem is in a transpiration stream.

Xylem vessels also provide support and strength to the plant structure. They are found in the middle of roots so they aren't crushed within the soil. They are found in the middle of the stem to provide strength and prevent bending. In the leaves, they are found in vascular bundles alongside the phloem and can be seen as the veins which network across the leaf.

AQA GCSE Biology (Combined Science) Unit 2: Organisation

Phloem vessels transport food such as dissolved sugars and glucose from photosynthesis. The food is transported around the plant to where growth is occurring (root and shoot tips), as well as to the organs which store the food. The transport occurs in all directions throughout the plant. The cells making up the phloem tube are living, with small holes in the walls where the cells are joined.

Transpiration and Translocation

Transpiration is the loss of water, by evaporation and diffusion, from the leaves of the plant. Water is a cohesive molecule and as it evaporates, there is less water in the leaf, so water from further back moves up to take its place. This, in turn, draws more water with it. This is the transpiration stream.

Transpiration occurs naturally as there is a tendency for water to diffuse from the leaves (where the concentration is relatively high) to the air around the plants (where the concentration is relatively low), via the stomata.

Environmental factors can change the rate at which transpiration occurs:

- Increased light intensity will increase the rate of transpiration because light stimulates the stomata to open. The leaf will also be warmed by the sunlight.
- Increased temperature will cause the water to evaporate more quickly and so increase the rate of transpiration.
- Increased humidity (moisture in the air) will reduce the rate of transpiration. Whereas if the air becomes drier, the rate increases. A greater concentration gradient will increase the rate of diffusion.
- If the wind speed increases, then the rate of transpiration also increases. This is because as the water surrounding the leaves is moved away more quickly, the concentration gradient is increased.
- If the water content in the soil is decreased, then the rate of absorption in the roots decreases. This causes the stomata to become flaccid and close, reducing transpiration. If the loss of turgor affects the whole plant, then it will wilt.

Disease Interactions

Having one type of illness can often make a person more susceptible to another type of illness:

- immune disorders → increased risk of infectious disease
- viral infection of cells → increased risk of cancer
- immune reactions → can trigger allergies
- very poor physical health → increased risk of depression or other mental illness

Health and Disease

Health is the state of being free from illness or disease. It refers to physical and mental wellbeing.

Disease and lifestyle factors, such as diet, stress, smoking, alcohol consumption and the use of illegal drugs, can all impact the health of a person.

Some conditions are associated with certain lifestyle choices:

- Liver conditions are associated with poor diet and prolonged excessive alcohol consumption.
- Lung cancer is associated with smoking.
- Memory loss, poor physical health and hygiene are associated with the use of illegal or recreational drugs.
- Obesity and diabetes are associated with poor diet.
- Anxiety and depression are associated with stress and prolonged excessive alcohol consumption.

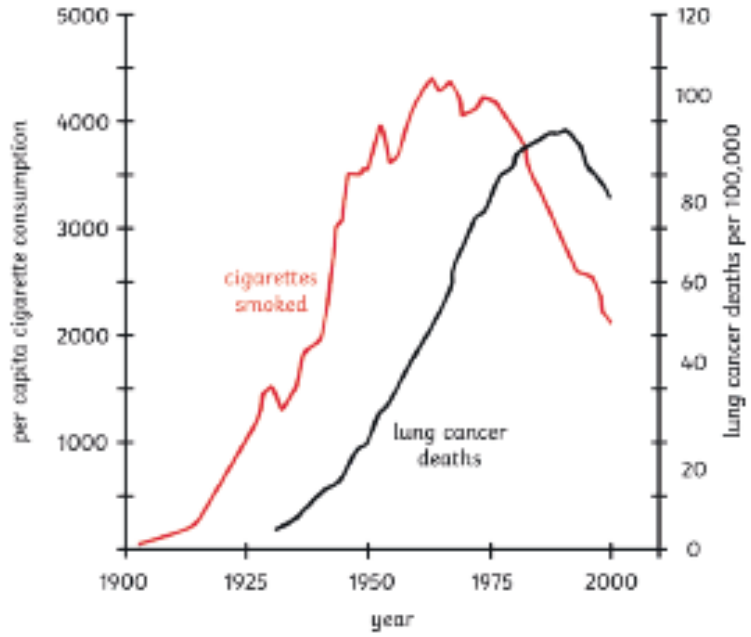
There can often be correlations between some factors and types of illness or specific diseases.

For example, in the graph shown to the right, there is a positive correlation between the number of cigarettes smoked and the number of lung cancer deaths.

However, there are other factors which can contribute to the development of lung cancer e.g. working with asbestos, genetic predisposition.

This means that although the evidence in the graph gives a strong indication that smoking is a cause of lung cancer, it cannot be stated that 'smoking will cause lung cancer'. Not every person who smokes will develop lung cancer and not every person who develops lung cancer will be a smoker.

Therefore, it can be stated that smoking increases the risk of lung cancer.



AQA GCSE Biology (Combined Science) Unit 2: Organisation

Heart Disease (Treatments)

There are a range of medical treatments for heart disease.

Treatment	Description	Advantages	Disadvantages
statins	**Drugs** used to lower cholesterol levels in the blood, by reducing the amount produced in the liver.	• Can be used to prevent heart disease developing. • Improved quality of life.	• Long-term treatment. • Possible negative side-effects.
stents	**Mechanical device** which is used to stretch narrow or blocked arteries, restoring blood flow.	• Used for patients where drugs are less effective. • Offers long-term benefits. • Made from metal alloys so will not be rejected by the patients body. • Improved quality of life.	• Requires surgery under general anaesthetic, which carries risk of infection.
heart transplant	The entire organ is replaced with one from an organ donor (a person who has died and previously expressed a wish for their organs to be used in this way).	• Can treat complete heart failure in a person. • extended life • Improved quality of life. • Artificial plastic hearts can be used temporarily until a donor is found.	• Requires major surgery under general anaesthetic, which carries risks. • Lack of donors available. • Risk of infection or transplant rejection. • Long recovery times.

Use the techniques at the front of the knowledge organiser to help you learn this science work. How original can you be. There are lots of activities on SAM Learning that directly link to your work.

AQA GCSE Chemistry (Combined Science) Unit 7: Organic Chemistry Knowledge Organiser

Crude Oil

Hydrocarbons are compounds that are made up of the elements hydrogen and carbon only.

Crude oil is a non-renewable resource, a fossil fuel. Crude oil is made up of a mixture of compounds, most of which are long- and short-chain hydrocarbons.

Most of the compounds in crude oil are hydrocarbons called alkanes. The alkanes form a homologous series. This is a family of hydrocarbons that all share the same general formula and have chemical properties that are similar.

Alkanes are held together by single bonds.

The general formula for an alkane is C_nH_{2n+2}.

They differ from the neighbouring alkane with the addition of a CH_2.

Alkanes are saturated hydrocarbons. This means that all their bonds are taken up and they cannot bond to any more atoms.

Alkanes have similar chemical properties but have different physical properties due to differences in chain length. The longer the chain, the higher the boiling point of the hydrocarbon.

The first four alkanes are: methane, ethane, propane and butane.

A mnemonic to help you remember the order of the alkanes: mice eat paper bags.

Fractional Distillation

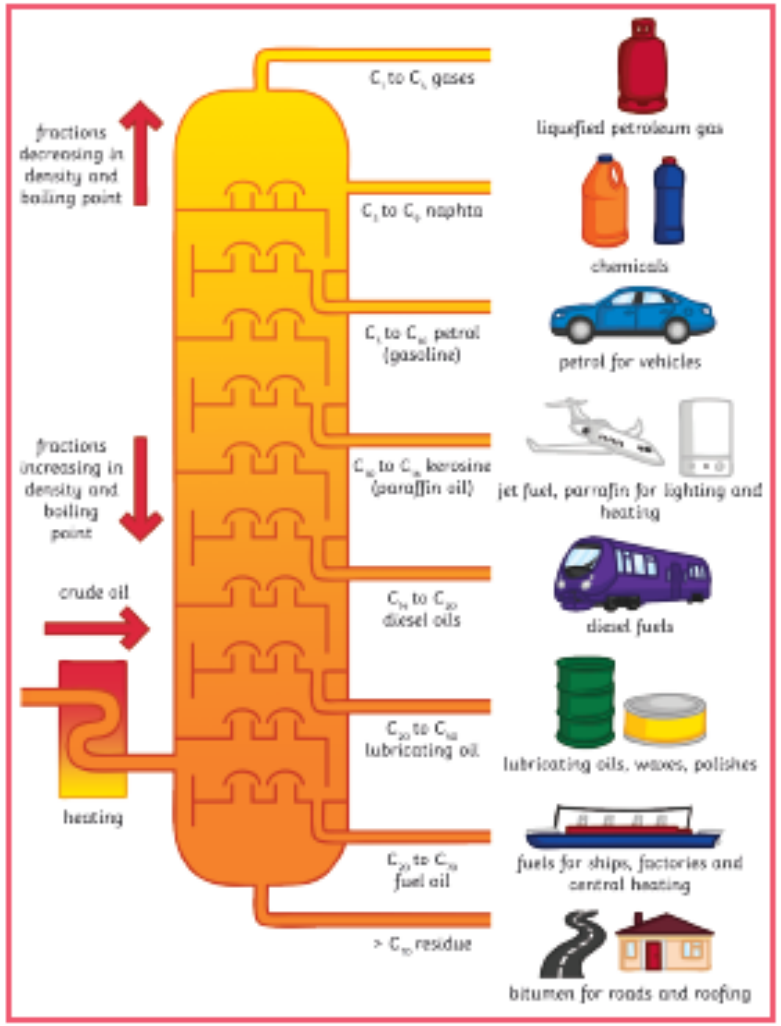
Fractional distillation is used to separate a mixture of long-chain hydrocarbons in crude oil into smaller, more useful fractions.

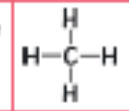
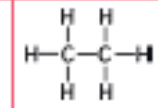
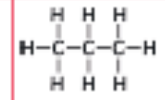
Hydrocarbons have different boiling points depending on their chain length. Each fraction contains hydrocarbons of a similar chain length. These fractions will boil at different temperatures due to the difference in sizes of the molecules. The different parts of crude oil are called fractions because they are a small part of the original mixture.

Crude oil is heated and enters at all column called a fractioning column. The column is hot at the bottom and decreases in temperature toward the top. As the crude oil is heated, it begins to evaporate and its vapours begin to rise up through the column. These vapours condense at the different fractions.

Short-chain hydrocarbons are found at the top of the column. This is because shorter chain molecules are held together by weak intermolecular forces resulting in low boiling points. These shorter chain hydrocarbons leave the column as gas.

Long-chain hydrocarbons are found at the bottom of the column and are held together by strong intermolecular forces, resulting in high boiling points.



Name of Alkane	Structural Formula	Molecular Formula
methane		CH_4
ethane		C_2H_6
propane		C_3H_8
butane		C_4H_{10}

Combustion

Complete combustion occurs when there is enough oxygen for a fuel to burn. A hydrocarbon will react with oxygen to produce carbon dioxide and water.

Incomplete combustion occurs when there isn't enough oxygen for a fuel to burn. The products in this reaction are water and poisonous carbon monoxide.

AQA GCSE Chemistry (Combined Science) Unit 7: Organic Chemistry Knowledge Organiser

Cracking

Cracking is an example of a thermal decomposition reaction. Long-chain hydrocarbons can be broken down into shorter, more useful hydrocarbon chains.

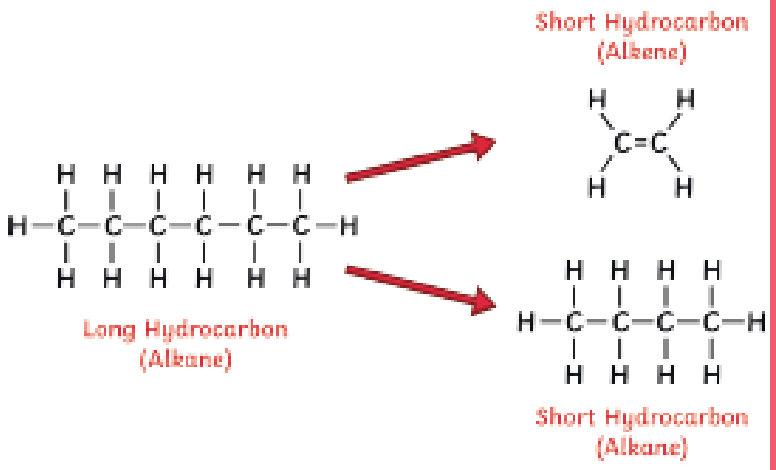
Cracking can be carried out with a catalyst in catalytic cracking or with steam in steam cracking.

Catalytic cracking involves heating a hydrocarbon to a high temperature (550°C) and passing over a hot catalyst.

Cracking of a long-chain hydrocarbon produces a short-chain alkane and an alkene.

Alkenes are another type of hydrocarbon that is double bonded. The general formula for an alkene is C_nH_{2n}.

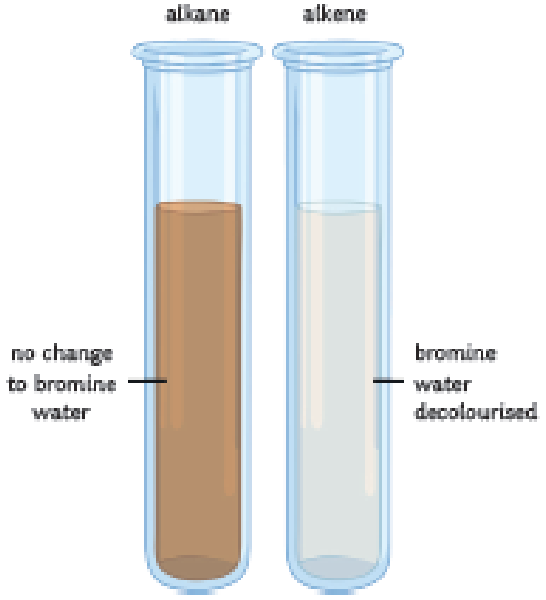
Alkenes are unsaturated hydrocarbons. In a chemical reaction, the double bond of the alkenes can break. This allows other atoms to bond to it.



Test for Alkanes

Bromine, when added to an alkane, will remain brown/orange. Alkanes are saturated hydrocarbons, they have no double bonds which could be broken to accept the bromine molecule and so remain orange.

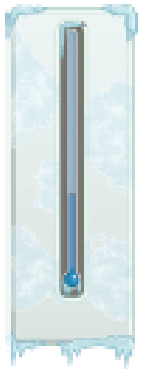
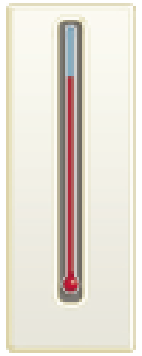
Bromine, when added to an alkene, will change from brown/orange to colourless. This is because alkenes are unsaturated hydrocarbons. The double bond breaks and the bromine molecule is accepted.



Making Polymers

The fractional distillation of crude oil and cracking produces an array of hydrocarbons that are key to our everyday lives.

Alkenes are used to produce plastics such as poly(ethene) which is used to make plastic bags, drinks bottles and dustbins. Poly(propene), another polymer, forms very strong, tough plastic.

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

AQA Combined Science: Physics Topic 2 Electricity – Foundation and Higher

Required Practical

Investigating Resistance in a Wire

Independent variable: length of the wire.

Dependent variable: resistance.

Control variables: type of metal, diameter of the wire.

Conclusion: As the length of the wire increases, the resistance of the wire also increases.

Investigating Series and Parallel Circuits with Resistors

Independent variable: circuit type (series, parallel).

Dependent variable: resistance.

Control variables: number of resistors, type of power source.

Conclusion: Adding resistors in series increases the total resistance of the circuit. In a parallel circuit, the more resistors you add, the smaller the resistance.

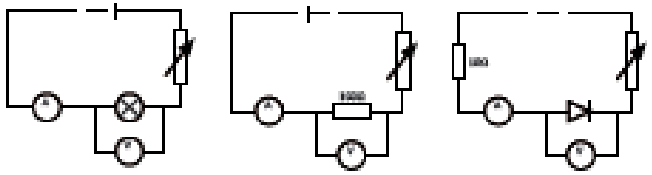
Investigating I-V Relationships in Circuits (Using a filament bulb, ohmic conductor, diode.)

Independent variable: potential difference/volts (V).

Dependent variable: current (A).

Control variable: number of components (e.g. 1 filament bulb, 1 resistor), type of power source.

Set up the circuits as shown below and measure the current and the potential difference.



Draw graphs of the results once collected.

Equations and Maths

Equations

Charge:	$Q = It$
Potential difference:	$V = IR$
Energy transferred:	$E = Pt$
Energy transferred:	$E = QV$
Power:	$P = VI$
Power:	$P = I^2R$

Maths

1kW = 1000W

0.5kW = 500W

Charge

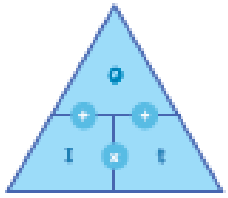
Electric current is the flow of electric charge. It only flows when the circuit is complete.

The **charge** is the current flowing past a point in a given time. Charge is measured in **coulombs (C).**

Calculating Charge

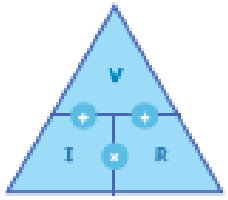
charge flow (C) = current (A) × time (s)

$Q = It$



potential difference = current x resistance

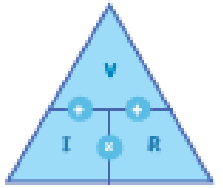
V (V) = I (A) × R (Ω)



Resistance

voltage (V) = current (A) × resistance (Ω)

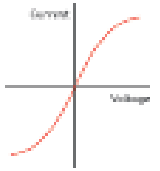
V = IR



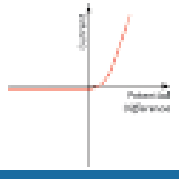
Graphs of I-V Characteristics for Components in a Circuit

1. **Ohmic conductor:** the current is directly proportional to the potential difference - it is a straight line (at a constant temperature).

2. **Filament lamp:** as the current increases, so does the temperature. This makes it harder for the current to flow. The graph becomes less steep.



3. **Diode:** current only flows in one direction. The resistance is very high in the other direction which means no current can flow.



Current and Circuit Symbols

Current: the flow of electrical charge.

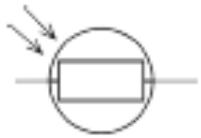
Potential difference (voltage): the push of electrical charge.

Resistance: slows down the flow of electricity.

cell		closed switch		fuse	
resistor		ammeter	A	LDR	
battery		voltmeter	V	LED	
variable resistor		bulb		thermistor	
open switch		diode			

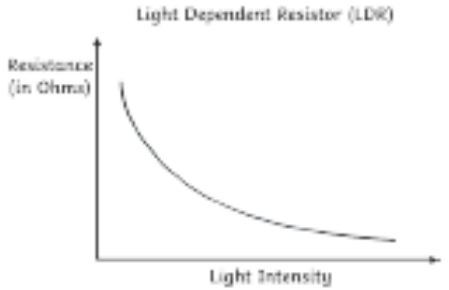
Circuit Devices

LDR – Light Dependent Resistor



An LDR is dependent on light intensity. In bright light the resistance falls and at night the resistance is higher.

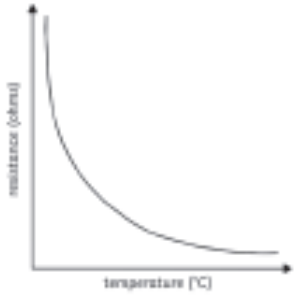
Uses of LDRs: outdoor night lights, burglar detectors.



Thermistor

A thermistor is a temperature dependent resistor. If it is hot, then the resistance is less. If it becomes cold, then the resistance increases.

Uses of thermistors: temperature detectors.



Series and Parallel Circuits

Series Circuits

Once one of the components is broken then all the components will stop working.

Potential difference – the total p.d. of the supply is shared between all the components.

$V_{total} = V_1 + V_2$

Current – wherever the ammeter is placed in a series circuit the reading is the same.

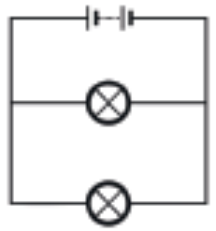
$I_1 = I_2 = I_3$

Resistance – In a series circuit, the resistance will add up to make the total resistance.

$R_{total} = R_1 + R_2$

Parallel Circuits

They are much more common - if one component stops working, it will not affect the others. This means they are more useful.



Potential Difference – this is the same for all components.

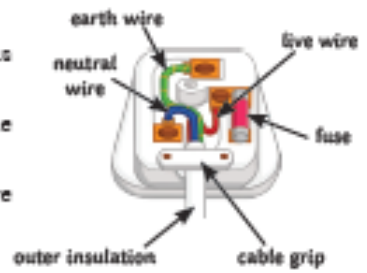
$V_1 = V_2$

Current – the total current is the total of all the currents through all the components.

$I_{total} = I_1 + I_2 + I_3$

Resistance – adding resistance reduces the total resistance.

Electricity in the Home



AC – alternating current. Constantly changing direction - UK mains supply is 230V and has a frequency of 50 hertz (Hz).

DC – direct current. Supplied by batteries and only flows in one direction.

Cables – most have three wires: live, neutral and earth. They are covered in plastic insulation for safety.

Live wire – provides the potential difference from the mains.

Neutral wire – completes the circuit.

Earth wire – protection. Stops the appliance from becoming live. Carries a current if there is a fault. Touching the live wire can cause the current to flow through your body. This causes an electric shock.

Energy Transferred – this depends on how long the appliance is on for and its power.

energy transferred (J) = power (W) × time (s) $E = Pt$

Energy is transferred around a circuit when the charge moves.

energy transferred (J) = charge flow (C) × potential difference (V) $E = QV$

power (W) = potential difference (V) × current (A) $P = VI$

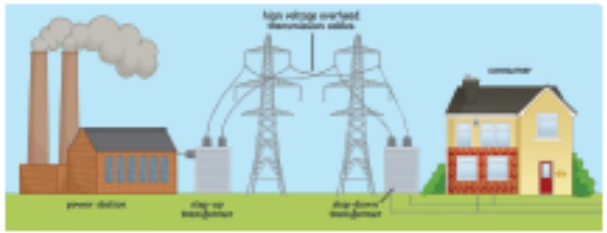
power (W) = current^2 (A) × resistance (Ω) $P = I^2R$

The National Grid

The National Grid is a system of cables and transformers. They transfer electrical power from the power station to where it is needed. Power stations are able to change the amount of electricity that is produced to meet the demands. For example, more energy may be needed in the evenings when people come home from work or school. Electricity is transferred at a low current, but a high voltage so less energy is being lost as it travels through the cables.

Step-up transformers – increase the voltage as the electricity flows through the cables.

Step-down transformers – decrease the potential difference to make it safe.



Knowledge Organiser: Year 9 Summer Term 1 Networks *Explore—how data travels the world*

Summary

A **network** is created when more than one device is connected together.

A network can be a small collection of computers connected within a building (e.g. a school, business or home) or it can be a wide collection of computers connected around the world.

The main purpose of networking is to share data between computers.

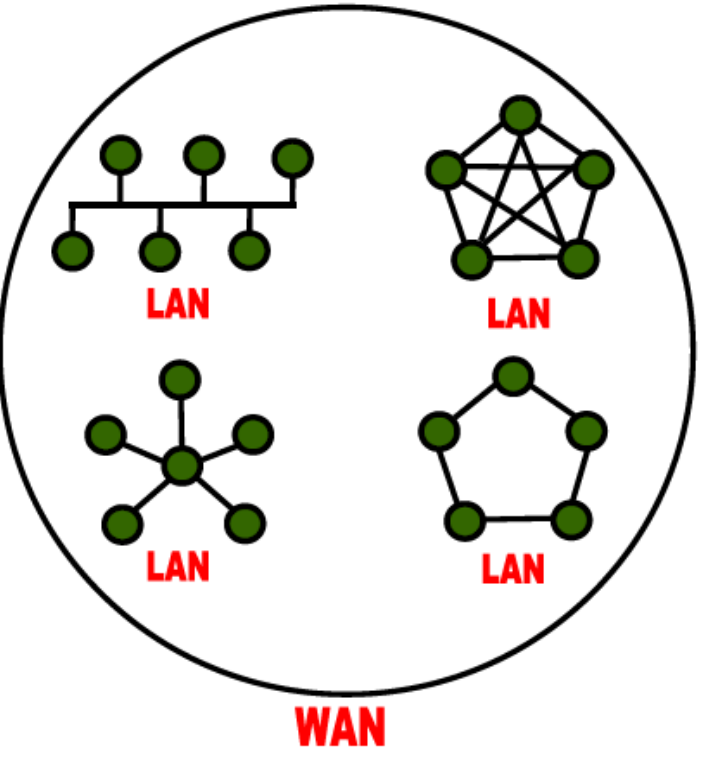
A file has to be broken up into small chunks of data known as **data packets** in order to be transmitted over a network. The data is then re-built once it reaches the destination computer.

Protocols are used to control how data is transmitted across networks. They are a set of rules for how messages are turned into data packets and sent across networks.

Bandwidth measures the amount of data that can transfer through a communications channel over a given period of time.

LANs and WANs

A school network is usually a **LAN**. LANs are often connected to WANs, for example a school network could be connected to the internet. **WAN**s can be connected together using the internet, leased lines or satellite links.



Advantages of networks

- Sharing devices such as printers saves money.
- Site (software) licences are likely to be cheaper than buying several standalone licences.
- Files can easily be shared between users.
- Network users can communicate by email and instant messenger.
- Security is good - users cannot see other users' files unlike on stand-alone machines.
- Data is easy to backup as all the data is stored on the file server.

Disadvantages of networks

- Purchasing the network cabling and file servers can be expensive.
- Managing a large network is complicated, requires training and a network manager usually needs to be employed.
- If the file server breaks down the files on the file server become inaccessible. Email might still work if it is on a separate server. The computers can still be used but are isolated.
- Viruses can spread to other computers throughout a computer network.
- There is a danger of hacking, particularly with wide area networks. Security procedures are needed to prevent such abuse, e.g. a firewall.

Key Vocabulary

File server	A networked **computer** that provides shared storage, it can be accessed by workstations on the same network.
Input device	Input devices, like a keyboard, allow us to put raw data in a computer which it processes to produce outputs.
LAN	**L**ocal **A**rea **N**etwork covers a small area such as one site or building, e.g. a school or a college.
Licence	A legal agreement between the company who published the software and the end user covering areas such as copyright.
Network	A network is a number of computers linked together to allow the sharing of resources.
Output device	A device used to output data or information from a computer, e.g. a monitor or printer.
Server	A computer that holds data to be shared with other computers. A web server stores and shares websites.
WAN	**W**ide **A**rea **N**etwork covers a large geographical area. Most WANs are made from several LANs connected together.
Workstation	A computer connected to a network.

The internet is a global **network** of computers. All computer devices (including PCs, laptops, games consoles and smartphones) that are connected to the internet form part of this network. Added together, there are billions of computers connected to the internet, all able to communicate with each other.

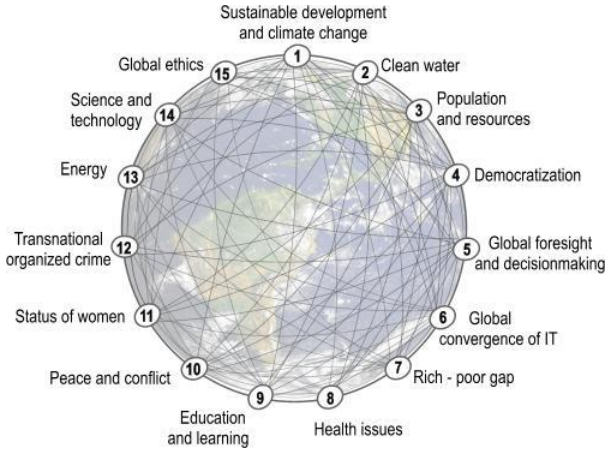
https://bbc.in/37yYD3x

KEEP CALM AND GO PRACTICE

BBC Bitesize

Activity: Use a video conferencing piece of software to explain the contents of this knowledge organiser to someone in your family who is not technically savvy. Break the knowledge down into lessons which you can do one a week.

Year 9 Knowledge organiser: Global challenges



Topics covered

- ✓ Types of challenges
- ✓ Population and resources
- ✓ Poverty and Wealth inequality
- ✓ Settlements and environmental quality
- ✓ Resource exploitation and environment
- ✓ Ecosystems and biodiversity
- ✓ Global Warming and Climate Change

Key Ideas:

1. I can describe global scale challenges
2. I can describe how human populations are un-equal
3. I can describe how human activities are damaging the environment
4. I can explain why opinions vary on solving global challenges
5. I can discuss ideas for a sustainable future

Skills

- ❑ To research using ICT
- ❑ To interpret a variety of graphs/infographics
- ❑ To use mapping to investigate deforestation and urbanisation
- ❑ To understand different opinions and viewpoints
- ❑ To write a detailed piece of extended writing
- ❑ To use ICT/MS Office to present to my class

Places and Environments

- ❖ Amazon rainforest
- ❖ Antarctica and Arctic
- ❖ India
- ❖ China
- ❖ Germany
- ❖ Tuvalu
- ❖ Maldives

Key Terms Used in this Unit

- Over-population
- Resource Consumption
- Water access
- Electrification
- Literacy
- Environmental Hazards
- Freedom
- Standard of Living
- Greenhouse gases
- Disease
- Global warming
- Climate Change
- Biodegradable plastics
- Pollution
- Deforestation
- Biodiversity
- Sustainability
- Transport
- Conservation

Activity: Use technology to find out how the virus is changing our energy use and pollution. Use your geography knowledge and use maps and diagrams to help you. Your report should include as much of the key vocabulary as possible.

Activity: How can the world work together to solve global problems in the future? Write a task list and manual for the president of the universe.

Activity: This is perfect if you have a younger sibling. You can do it together. Draw a table showing the countries, flags and capital cities. Do one per continent. Put as many countries in as you can.

Country	Nationality	Capital	Flag
Portugal	Portuguese	Lisbon	
Spain	Spanish	Madrid	
Great Britain			

Year 9 Spring Term Spanish Knowledge Organiser

La ciudad

En la ciudad	***In the city***
¿Qué hay en Barcelona?	*What is there in Barcelona?*
En Barcelona hay muchas cosas:	*In Barcelona there are many things:*
el acuario, el cine IMAX	*the aquarium, the IMAX cinema...*
¿Adónde vas?	*Where are you going to?*
Voy...	*I'm going...*
al acuario	*to the aquarium*
al Camp Nou	*to the Camp Nou football stadium*
al cine IMAX	*to the IMAX cinema*
al monumento a Colón	*to the Columbus Monument*
al museo Picasso	*to the Picasso Museum*
al Tibidabo	*to the Tibidabo funfair*
a la playa de la Barceloneta y el mar	*to Barceloneta beach and the sea*
a la plaza de Cataluña	*to the Plaza Cataluña*
a la Sagrada Familia	*to the Sagrada Familia church*
a la torre Agbar	*to the Agbar Tower*
a la Villa Olímpica	*to the Olympic Village*
a las Ramblas	*to the Ramblas*

Me gusta Barcelona porque...	*I like Barcelona because...*
me encanta...	*I love...*
me gusta mucho...	*I really like...*
ir de compras	*going shopping*
mirar pinturas	*looking at paintings*
montar en las atracciones del parque	*going on the rides at the funfair*
sacar fotos	*taking photos*
tomar el sol	*sunbathing*
ver partidos de fútbol	*watching football matches*
ver películas	*watching films*
ver tiburones	*watching sharks*
Le gusta mucho....	*He/She really likes...*
Le encanta....	*He/She loves...*

De compras	***Shopping***
¿Dónde se puede comprar...?	*Where can you buy....?*
carne	*meat*
comida	*food*
pan	*bread*
ropa	*clothes*
un café	*a coffee*
un regalo	*a present*

Year 9 Spring Term Spanish Knowledge Organiser

La ciudad

¿Dónde se pueden comprar...?	***Where can you buy...?***
pasteles	*cakes*
joyas	*jewellery*
zapatos	*shoes*
libros	*books*
Se puede/pueden comprar...	*You can buy...*
en...	*in...*
un supermercado	*a supermarket*
una cafetería	*a café*
una carnicería	*a butcher's*
una joyería	*a jeweller's*
una librería	*a bookshop*
una panadería	*a baker's/bread shop*
una pastelería	*a cake shop*
una tienda de música	*a music shop*
una tienda de ropa	*a clothes shop*
una zapatería	*a shoe shop*

Las direcciones	***Directions***
Perdón...	*Excuse me...*
¿Dónde está el museo Picasso?	*Where is the Picasso museum?*
¿Dónde están las Ramblas?	*Where are the Ramblas?*
A ver...	*Let's see...*
Bueno...	*Well...*
Pues...	*Well...*
luego	*then*
Sigue todo recto.	*Go straight on.*
Dobla a la derecha.	*Turn right.*
Dobla a la izquierda.	*Turn left.*
Cruza la plaza.	*Cross the square.*
Toma la segunda calle a la derecha.	*Take the second street on the right.*
Toma la segunda calle a la izquierda.	*Take the second street on the left.*
Está al final de la calle.	*It's at the end of the street.*
Está a la derecha.	*It's on the right.*
Está a la izquierda.	*It's on the left.*
Está aquí.	*It's here.*

Year 9 Spring Term Spanish Knowledge Organiser

La ciudad

Soy turista...	***I'm a tourist...***
Hoy...	*Today...*
Estoy en Barcelona.	*I'm in Barcelona.*
Es genial.	*It's great.*
Anteayer...	*The day before yesterday...*
Ayer por la tarde...	*Yesterday evening...*
fui a la playa	*I went to the beach*
comí paella y bebí limonada	*I ate paella and drank lemonade*
descansé un poco	*I had a little rest*
Lo pasé fenomenal.	*I had a wonderful time.*
Me gustó.	*I liked it.*
No me gustó.	*I didn't like it*
Mañana...	*Tomorrow...*
Pasado mañana...	*The day after tomorrow...*
voy a ir al Tibidabo	*I'm going to go to the Tibidabo*
voy a ir de compras	*I'm going to go shopping*
voy a comprar unas camisetas	*I'm going to buy some T-shirts*

Palabras muy útiles	***Very useful words***
a, al	*to, to the*
hay	*there is/there are*
¿dónde?	*where?*
¿adónde?	*where?, to where?*
en	*in, at*
hoy	*today*
ayer	*yesterday*
anteayer	*the day before yesterday*
mañana	*tomorrow*

Year 9 Spanish Summer Term 1. En la ciudad (2.6) & Los medios de comunicación (3.1)

En la ciudad	*In the city*
¿Qué hay en Barcelona?	*What is there in Barcelona?*
En Barcelona hay muchas cosas: el acuario, el cine IMAX ...	*In Barcelona there are many things: the aquarium, the IMAX cinema ...*
¿Adónde vas?	*Where are you going (to)?*
Voy ...	*I'm going ...*
al acuario	*to the aquarium*
al Camp Nou	*to the Camp Nou (football) stadium*
al cine IMAX	*to the IMAX cinema*
al monumento a Colón	*to the Columbus Monument*
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tomar el sol	*sunbathing*
ver partidos de fútbol	*watching football matches*
ver películas	*watching films*
ver tiburones	*watching sharks*
Le gusta (mucho) ...	*He/She (really) likes ...*

De compras	*Shopping*
¿Dónde se puede comprar ...?	*Where can you buy ...?*
carne	*meat*
comida	*food*
ropa	*clothes*
¿Dónde se pueden comprar ...?	*Where can you buy ...?*
pasteles	*cakes*
joyas	*jewellery*
zapatos	*shoes*
libros	*books*
CDs	*CDs*

Se puede(n) comprar ...	*You can buy ...*
en ...	*in ...*
un supermercado	*a supermarket*
una cafetería	*a café*
una carnicería	*a butcher's*
una joyería	*a jeweller's*
una librería	*a bookshop*
una panadería	*a baker's/bread shop*
una pastelería	*a cake shop*
una tienda de música	*a music shop*
una tienda de ropa	*a clothes shop*
una zapatería	*a shoe shop*

Year 9 Spanish Summer Term 1. En la ciudad (2.6) & Los medios de comunicación (3.1)

Las direcciones	
	Directions
Perdón ...	*Excuse me ...*
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¿Dónde están las Ramblas?	*Where are the Ramblas?*
A ver ...	*Let's see ...*
Bueno ...	*Well ...*
Pues ...	*Well ...*
Sigue todo recto.	*Go straight on.*
Dobla a la derecha.	*Turn right.*
Cruza la plaza.	*Cross the square.*
Toma la segunda calle a la derecha.	*Take the second (street) on the right.*
Toma la segunda calle a la izquierda.	*Take the second (street) on the left.*
Está a la derecha.	*It's on the right.*
Está a la izquierda.	*It's on the left.*
Está aquí.	*It's here.*

Soy turista ...	*I'm a tourist ...*
Hoy ...	*Today ...*
Estoy en Barcelona.	*I'm in Barcelona.*
Es genial.	*It's great.*
descansé un poco	*I had a little rest*
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Me gustó.	*I liked it.*
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Mañana ...	*Tomorrow ...*
Pasado mañana ...	*The day after tomorrow ...*
voy a ir al Tibidabo	*I'm going to go to the Tibidabo*
voy a ir de compras	*I'm going to go shopping*
voy a comprar unas camisetas	*I'm going to buy some T-shirts*

Palabras muy útiles	*Very useful words*
a (al)	*to (to the)*
hay	*there is/there are*
¿dónde?	*where?*
¿adónde?	*(to) where?*
en	*in, at*
hoy	*today*
Ayer	*yesterday*

Estrategia

The gender of nouns

You can often work out whether a noun is masculine or feminine by looking at the ending of the word:

- Most nouns ending in **-o**, **-or** and **-ón** are masculine.
- Most nouns ending in **-a**, **-dad** and **-ción** are feminine.

But be careful! There are exceptions, for example:

el problema **la** foto

To check, use a dictionary: look for the abbreviations *nm* (masculine noun) and *nf* (feminine noun).

Can you work out the gender of these nouns from Module 6 without using a dictionary?

- ciudad
- supermercado
- pastelería
- pintor
- tiburón
- canción

Year 9 Spanish Summer Term 1. En la ciudad (2.6) & Los medios de comunicación (3.1)

Mi ordenador	*The computer*
¿Qué haces con tu ordenador?	*What do you do with your computer?*
Leo y escribo correos.	*I read and write emails.*
Descargo música.	*I download music.*
Navego por internet.	*I surf the net.*
Juego.	*I play games.*
Chateo.	*I chat online.*
Hago mis deberes.	*I do my homework.*
Veo DVDs.	*I watch DVDs.*
Compro regalos.	*I buy presents.*
todos los días	*every day*
dos veces a la semana	*twice a week*
los fines de semana	*at weekends*
a veces	*sometimes*
nunca	*never*

La televisión	*Television*
¿Cuál es tu programa favorito?	*What's your favourite television programme?*
Mi programa favorito es ...	*My favourite programme is ...*
Es ...	*It's ...*
un concurso	*a game show*
un documental	*a documentary*
un programa de deporte	*a sports show*
un programa de música	*a music show*
un programa de tele-realidad	*a reality show*
el telediario	*the news*
el tiempo	*the weather*
una comedia	*a comedy*
una serie de policías	*a detective series*
una telenovela	*a soap opera*

¿Por qué te gusta?	*Why do you like it?*
Me gusta/Me gustan...	*I like...*
Me encanta/Me encantan ...	*I love ...*
No me gusta/No me gustan ...	*I don't like ...*
porque es ...	*because it is*
porque son ...	*because they are ...*
aburridos/as	*boring*
divertidos/as	*entertaining*
educativos/as	*educational*
emocionantes	*moving*
informativos/as	*informative*
interesantes	*interesting*
malos/as	*bad*
tontos/as	*stupid*
un rollo	*a drag*

Las películas	*Films*
¿Qué tipo de películas prefieres?	*What sort of films do you prefer?*
Prefiero...	*I prefer...*
las películas de ...	*... films*
acción	*action*
amor	*romantic*
artes marciales	*martial arts*
ciencia-ficción	*sci-fi*
guerra	*war*
terror	*horror*
las películas del Oeste	*Westerns*
las comedias	*comedies*
los dibujos animados	*cartoons/animations*

Más o menos	*More or less*
más ... que	*more ... than*
menos ... que	*less ... than*
Los dibujos animados son más divertidos que las películas de terror.	*Cartoons are funnier than horror films.*

Year 9 Spanish Summer Term 1. En la ciudad (2.6) & Los medios de comunicación (3.1)

Las comedias son menos interesantes que las películas del Oeste.	*Comedies are less interesting than Westerns.*

La música	*Music*
la música clásica	*classical music*
la música de los años sesenta	*sixties music*
la música electrónica	*electronic music*
la música latina	*Latin music*
la música pop	*pop*
el jazz	*jazz*
el rap	*rap*
el rock	*rock*
¿Qué tipo de música te gusta?	*What sort of music do you like?*
Me encanta la música pop.	*I love pop music.*
Me gusta mucho el rap.	*I really like rap.*
Me gusta el jazz.	*I like jazz.*
No me gusta la música latina.	*I don't like Latin music.*
No me gusta nada el rock.	*I don't like rock at all.*
Fui a un concierto	*I went to a concert*
¿Adónde fuiste?	*Where did you go?*
Fui a un concierto de Shakira.	*I went to a Shakira concert.*

¿Con quién saliste?	*Who did you go out with?*
Salí con ...	*I went out with ...*
¿Qué hiciste ...?	*What did you do ...?*
Compré una camiseta.	*I bought a T-shirt.*
Saqué fotos.	*I took photos.*
¿Qué comiste?	*What did you eat?*
Comí una pizza.	*I ate a pizza.*
¿Cómo fue?	*How was it?*
Fue ...	*It was ...*
estupendo	*fantastic*
guay	*cool*
aburrido	*boring*
un desastre	*a disaster*
ayer	*yesterday*
la semana pasada	*last week*
el fin de semana pasado	*last weekend*

Palabras muy útiles	*Very useful words*
y	*and*
pero	*but*
o	*or*
también	*also, as well*
luego	*then*
después	*afterwards*

Estrategia

Using the preterite

- Many of the verbs in Module 1 are regular in the preterite:

escuchar (*to listen*)	escuché (*I listened*)
comer (*to eat*)	comí (*I ate*)
salir (*to go out*)	salí (*I went out*)

- You've also met some verbs that are irregular:

ver (*to see*)	vi (*I saw*)
hacer (*to do/make*)	hice (*I did/made*)
ser (*to be*)	fui (*I was*)
ir (*to go*)	fui (*I went*)

Often, the irregular verbs don't have the accents that regular ones do.

Try writing these verbs out on sticky notes and sticking them on your diary, around your bedroom or on the fridge, so that you see them often and learn them.

Year 9 – Russian Revolutions and Jack the Ripper

Key words	
Tsar	Monarch or emperor of Russia
Autocracy	A political system where the country is ruled by one monarch who holds all political power
Revolution	A sudden and significant change to the political system in a country, usually involving the overthrow of the previous government or ruler
Bolshevik	Name of the Russian Communist Party who take control of Russia in 1917
Lenin	Leader of the Bolsheviks until his death in 1924
1905 Revolution	Russia's first Revolution in which the Tsar's power is threatened but survives with some minor changes
February Revolution	Takes place in 1917 and sees the overthrow of the Tsar and his replacement with the 'Provisional Government'
October Revolution	Takes place in 1917, led by the Bolsheviks, and sees the overthrow of the Provisional Government
Jack the Ripper	Nickname given to a serial killer who killed at least five prostitutes in Whitechapel in 1888
Whitechapel	The very poor area of London in which 'Jack the Ripper' carried out his murders.

Russia in 1905

By 1905, the vast majority of Russia was still a backward country mostly based on farming. Peasants worked hard and were often vulnerable to famine and disease. However, they were very religious and very loyal to the Tsar of Russia.

In 1905 Russia had its first Revolution. Although the protesters mostly did not wish to overthrow the Tsar they did demand some changes. This had 3 main causes:

- Ongoing poverty and inequality in Russia, and as inflation, hunger and taxation increased the peasants began to protest
- The Russian army/navy were humiliated by the Japanese in the Russo-Japanese war, so people were angry and some blamed the Tsar
- Bloody Sunday was a protest in the capital city of St. Petersburg where the Tsar ordered his troops to shoot the protesters

Despite a large amount of opposition in 1905, Tsar Nicholas II was able to survive and introduce only very limited changes.

However, in 1917 there were two revolutions in Russia that changed the country forever. On the right are some of the key features of both.

February 1917 Revolution	**October 1917 Revolution**
Caused by the Tsar's failure to end the war despite its effects on the Russian people.	Caused by the Provisional Government's failure to end the war, despite promising they would.
Caused by increasing demands for democracy in Russia by many different political groups.	Caused by the actions of the Communists who wanted Russia to become a Communist country.
Caused by ongoing poverty and suffering in Russia.	Caused by ongoing poverty and suffering in Russia.
Led to the creation of a Provisional Government who planned to bring in free elections	Led to the replacement of the Provisional Government with a Communist government
Although they imprisoned much of their opposition, the Government eventually lost control and the Bolsheviks took power	Once in power, the Bolsheviks fought the Russian Civil War against those who wanted the Tsar to return. They won and remained in power.

Activity: Recreate the knowledge organiser into new resources. Make flash cards for key words.

Challenge: Find out about Rasputin. He is a fascinating character. How could one peasant in Russia have so much influence? What was the impact?

'Jack the Ripper'

In Whitechapel in 1888 the murders of five prostitutes were strongly suspected to be the work of a single person. Although the murderer was never caught, he was given the name 'Jack the Ripper'.

The murders took place in the area of Whitechapel, London. It was possible for the killer to escape partly because the crime rate in Whitechapel was so high.

Prostitutes were often victims of violent crime; they were alone with men, spent a lot of time out at night and many had no family able to protect them.

The victims

1. Mary Ann Nichols– 31st August 1888

Mary was found dead in the middle of the street. She had had her throat cut and her belly sliced open.

2. Annie Chapman– 8th September 1888

Annie Chapman was found in a yard, again with her throat cut and her belly sliced open. The fact that many people were close by suggests the killer was silent. Elizabeth Long reported seeing Annie talking to a foreign gentlemen with a shabby genteel appearance.

3. Elizabeth Stride– 30th September 1888

Elizabeth Stride was found dead in a pub back yard. Her throat had been cut however the killer had been disturbed before he could mutilate her body. This seemed to anger him and he went in search of another victim.

4. Catherine Eddowes– 30th September 1888

Later that same night Catherine Eddowes was murdered in Mitre Square. The killer was clearly frustrated by his earlier failure as the cuts were deeper and more frantic than the others.

5. Mary Jane Kelly– 9th November 1888

This was the most gruesome of the murders. Mary Kelly invited the murderer back to her home where the murder took place. Jack the Ripper spent hours mutilating her body. This was the most gruesome murder by far.

Why wasn't the killer caught?

It is likely that, had he been around today, Jack the Ripper would have been caught. However there were several reasons why he was able to get away with it.

Some of these have to do with the failures of the Police at the time:

- The police ignored and sometimes destroyed key evidence, such as writing on Catherine Eddowes' wall (a crime scene)
- The two police forces involved did not communicate well with each other
- The police offered no reward for information
- Much of the evidence the police used came from unreliable witnesses

However, there were also factors outside of Police control:

- Whitechapel was like a maze which made it easy for criminals to hide and escape
- The press were very critical of the police and mocked even some of their sensible tactics
- Many fake letters were sent to the police, claiming to be from the killer.

Activity: Why are we so fascinated by the story of Jack the Ripper? Who was Long Tall Sally and how does she fit into the story?

Vocabulary to learn

Identify
Explain
Evaluate
Extent
Statement
Perspective
Writer's craft
Descriptive
Discursive
Non-fiction
Fiction
Article
Report
Speech
Letter
Formal
Informal
Protest
Rebellion
Segregation
Prejudice

Links to news sights for vocab and form revision

https://www.bbc.co.uk/news

https://www.independent.co.uk/

Structure analysis checklist:

- Zoom in/out
- Repetition of an image/idea
- Links and connections between paragraphs
- Shifts:
  - inside to outside (and vice versa)
  - focus
  - time
  - topic
  - setting/place
  - mood/atmosphere
  - description to dialogue (and vice versa)

Language analysis checklist:

- Link to task
- Relevant quote
- Meaning of quote
- Method named
- Effects explained
- Word zoomed in on
- Meaning of word
- Implied meanings
- Aim higher: layers of meaning

Evaluate

- The impressions you have of the text in relation to a statement
- The methods the writer has used to create these impressions
- How the particular **methods** create these impressions

Methods

- **Linguistic devices** – *simile, metaphor, personification, repetition, rhetorical question etc.*
- **Word choices** – *nouns, adjectives, verbs, adverbs etc.*
- **Sentence forms** – *fragment, simple, compound, complex*

Checklist:

1. Capitals
2. Full stop .
3. Exclamation !
4. Question ?
5. Comma ,
6. Apostrophe ’
7. Ellipsis …
8. Semi colon ;
9. Colon :

Descriptor from GCSE assessment criteria
Level 4: simple vocabulary Bad Good Light Happy
Level 5: effective vocabulary Negative Positive Bright Jolly
Level 6: sophisticated vocabulary Awful Fantastic Brilliant Ecstatic
Levels 7-9: ambitious vocabulary Immoral Virtuous Dazzling Elated

Persuasive techniques

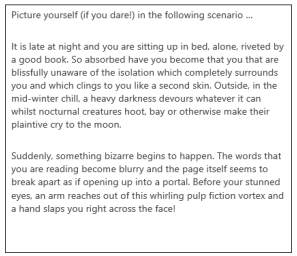
- Rhetorical questions – poses a question that begs to be agreed with
- Lists – a number of things broken up with commas or semi-colons
- Using 3 – using 3 reasons makes it sound like there could be even more
- Hyperbole - exaggeration
- Alliteration – same sounds close together (catchy/memorable)
- Repetition – makes it memorable
- Personal pronouns – you, I, we (speaks to the person reading/listening)
- Direct address – as above
- Imperatives – commanding words e.g. must, will.
- Emotive language – tugs on the readers'/audiences' heartstrings
- Incentives – reasons why that benefit the reader/audience
- Anecdote – personal stories
- Metaphor – comparison to create an image for the reader/audience

Picture yourself (if you dare!) in the following scenario …

It is late at night and you are sitting up in bed, alone, riveted by a good book. So absorbed have you become that you that are blissfully unaware of the isolation which completely surrounds you and which clings to you like a second skin. Outside, in the mid-winter chill, a heavy darkness devours whatever it can whilst nocturnal creatures hoot, bay or otherwise make their plaintive cry to the moon.

Suddenly, something bizarre begins to happen. The words that you are reading become blurry and the page itself seems to break apart as if opening up into a portal. Before your stunned eyes, an arm reaches out of this whirling pulp fiction vortex and a hand slaps you right across the face!

I've got a confession to make: I really love Sherlock. The modern reimagining of Sir Arthur Conan Doyle's classic detective starring Benedict Cumberbatch is engrossing television. Its feature length episodes feature the type of sharp writing and slick production values traditionally found in a Hollywood blockbuster. It's the type of quality entertainment that has led scholars and armchair critics to suggest we're currently in the second golden age of television. Another confession: I paid for every single episode. First from iTunes. Then, later, by subscribing to the Australian streaming service Stan. Why? I reckon the writers, actors, camera operators, gaffers and catering staff on such a tremendous show should be rewarded for their hard work.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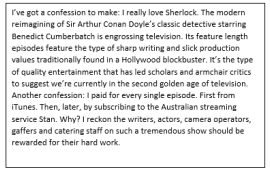
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- Write a definition for each of the words in the vocabulary box. If you don't know them try asking someone else or getting someone to look them up for you. Give the list to a parent, carer or sibling and see how many you can learn to spell.
- Write about anything of your choice using at least 5 words from the list.
- Provide an example of 3 of the persuasive techniques from the box.
- Read the extract and explain how the author has used linguistic devices, word choices and sentence forms to engage the reader. Use **PEEZL** to explain.
- Continue the story using some of the punctuation marks in the checklist. Try to use some of the words from the Descriptor from the **GCSE** assessment criteria. Ask a parent, carer of sibling to assess your story using the checklist.
- Read the extract about Sherlock Holmes. Select three ways in which the author uses language/devices to persuade us that he/she thinks Sherlock Holmes is really effective. Write using **PEEZL**. Use the devices box to identify techniques.
- Write a review of a film, book or TV programme of your choices and use language and language devices to persuade everyone that your choice is the best.
- Research the Victorian novel and write a non-fiction article about the types of novels enjoyed by the Victorians.
- Using the story on the next page, create a news story using language and punctuation for effect.
- Write a commentary about why you used particular language and punctuation and your desired impact on reader.

Topic: Algebra

Topic/Skill	Definition/Tips	Example
1. Expression	A mathematical statement written using symbols, numbers or letters,	3x + 2 or $5y^2$
2. Equation	A statement showing that two expressions are equal	2y – 17 = 15
3. Identity	An equation that is true for all values of the variables An identity uses the symbol: ≡	$2x \equiv x+x$
4. Formula	Shows the relationship between two or more variables	Area of a rectangle = length x width or A= LxW
5. Simplifying Expressions	Collect 'like terms'. Be careful with negatives. x^2 and x are not like terms.	$2x+3y+4x-5y+3=6x-2y+3$ $3x+4-x^2+2x-1=5x-x^2+3$
6. x times x	The answer is x^2 not $2x$.	Squaring is multiplying by itself, not by 2.
7. $p \times p \times p$	The answer is p^3 not $3p$	If p=2, then p^3=2x2x2=8, not 2x3=6
8. $p+p+p$	The answer is 3p not p^3	If p=2, then 2+2+2=6, not $2^3=8$
9. Expand	To expand a bracket, multiply each term in the bracket by the expression outside the bracket.	$3(m+7)=3x+21$
10. Factorise	The reverse of expanding. Factorising is writing an expression as a product of terms by 'taking out' a common factor.	$6x-15=3(2x-5)$, where 3 is the common factor.

Revise last half term's work by using these QR codes.

Volume

goo.gl/ZLDpVQ

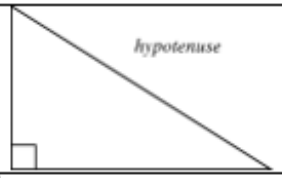
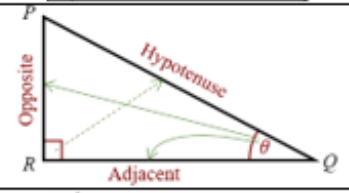
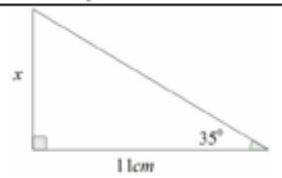
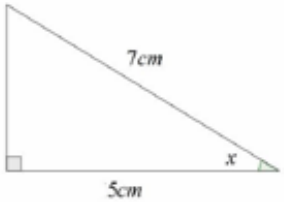
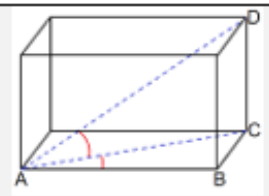
goo.gl/BvX2RM

Coordinates

goo.gl/mrXb3m

goo.gl/UfGc90

Topic: Right Angled Trigonometry

Topic/Skill	Definition/Tips	Example
1. Trigonometry	The study of triangles.	
2. Hypotenuse	The longest side of a right-angled triangle. Is always opposite the right angle.	
3. Adjacent	Next to	
4. Trigonometric Formulae	Use **SOHCAHTOA.** $\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$ $\tan\theta = \frac{O}{A}$ 	 Use 'Opposite' and 'Adjacent', so use 'tan' $\tan 35 = \frac{x}{11}$ $x = 11\tan 35 = 7.70cm$
	When finding a missing angle, use the 'inverse' trigonometric function by pressing the 'shift' button on the calculator.	 Use 'Adjacent' and 'Hypotenuse', so use 'cos' $\cos x = \frac{5}{7}$ $x = \cos^{-1}\left(\frac{5}{7}\right) = 44.4°$
5. 3D Trigonometry	Find missing lengths by identifying right angled triangles. You will often have to find a missing length you are not asked for before finding the missing length you are asked for.	

Year 9 RS: Is it ever right to fight?

Key words	
Peace	A state of mutual harmony between people and countries.
Ahimsa	The principle of non-injury to all living things.
Just War Theory	This is a war that is fought in a fair and noble way.
Jihad	A struggle or fight against the enemies of Islam.
Greater Jihad	A struggle with oneself to be a good Muslim
Lesser Jihad	A struggle with oneself and the rest of the world.
War	A state of conflict and tension between countries.
Pacifism	Not believing in violence.

'A kind word with forgiveness is better than charity followed by injury' *Surah, Qur'an 2:263*

'If anyone does evil or wrongs his own soul, but afterwards seeks God's forgiveness, he will find God often forgiving, Most Merciful.'
Surah , Qur'an 4:110

'Be forgiving and control yourself in the face of provocation; give justice to the person who was unfair and unjust to you; give to the one who did not help you when you were in need, and keep fellowship with the one who did not care about you.' *Hadith*

Christian Teachings on War and Peace.

In the Old Testament in the Bible God commanded the Israelites to fight against nations that had sinned against Him. These were called 'holy wars' because they were against nations who had blasphemed about the Israelite God *'Yahweh'*.

In the Bible a shepherd boy **David** killed a giant called **Goliath** with a small slingshot. Goliath had publicly provoked the Israelites and defied God's name, and David stepped forward to challenge him. This ended the battle and showed God's power, might and glory to the rest of the nation. Sometimes, fighting can be the lesser of two evils, to defeat evil and encourage peace. In the New Testament Jesus believed in peace and love, he did not encourage people to fight or wage war on each other. War encourages people to be selfish and inflict physical and mental suffering on each other. War leads to a breakdown of trust and love between humans and it brings nothing but misery for everyone involved. Jesus was a pacifist (he believed in peace) and said whoever uses violence to get what they want will have violence done against them. He told Christians they must: "Love your neighbour as yourself." This means loving and showing forgiveness when someone does something wrong rather than seeking revenge. The Bible seems to give two messages about war. In the Old Testament God was instructing his people to attack and kill their enemies and quote, "An eye for an eye and a tooth for a tooth."

Muslim Teachings on War and Peace.

The Arabic word for struggle is jihad. All Muslims have a daily struggle or Jihad to make society perfectly Muslim. This includes struggling with yourself and your desires and not fighting. This is the greater jihad.

The lesser jihad is the struggle with forces outside yourself by means of war.

Muslims call wars fought in the name of Allah a Jihad or Holy War.

What are the rules/limits for Muslims?

It must be a last resort – all non-violent methods to solve the problem must have been tried. It must be authorised and led by a Muslim authority. It must be fought in such a way as to cause the minimum amount of suffering.

Innocent civilians (especially the old, the young, and women) must not be attacked.

It must be ended as soon as the enemy lays down their arms.

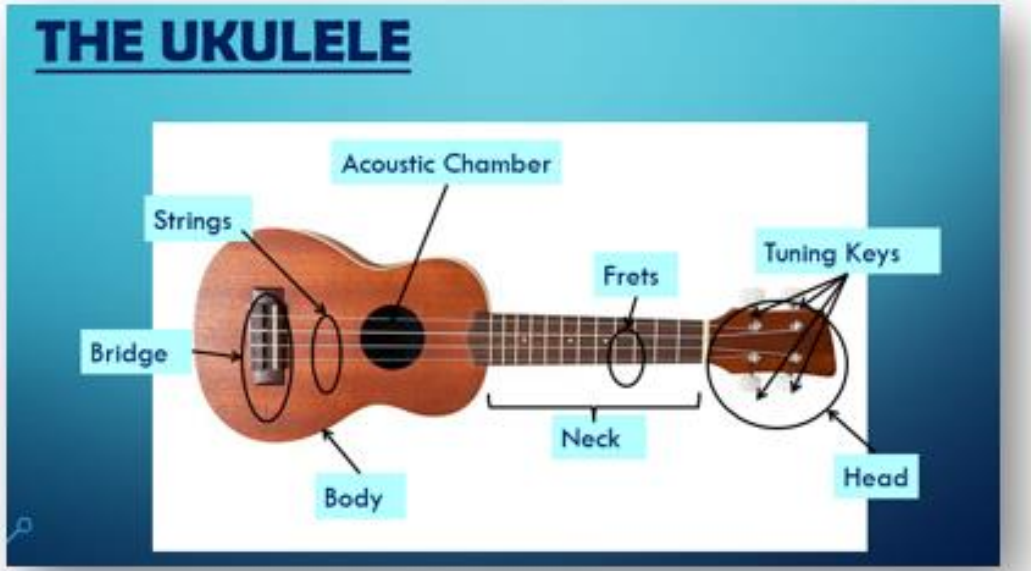
This shows that God encouraged revenge for things that were done against someone's wishes. However, in the New Testament Jesus said he had come to bring peace and no good could ever come from violence. Jesus also said, "Those who live by the sword shall die by the sword." Patience, forgiveness and love were the only ways to deal with violence and war. This is the point of view most Christians try to follow.

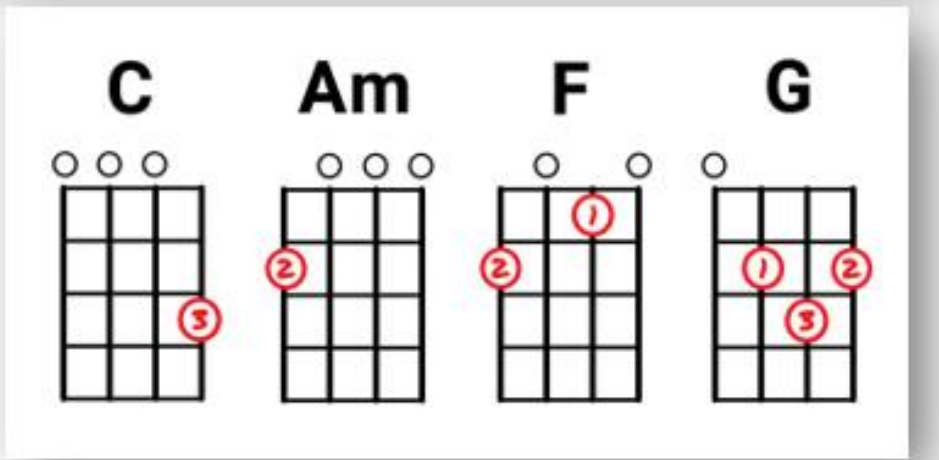
Some Christians, however, feel there are certain conditions that can lead to war being acceptable. Violence can be used to uphold peace and freedom and resist attack. Violence must promote good or avoid evil and those who are to be attacked must deserve it. This is called a "Just War". Peace and justice must always be restored once a war has happened. Many Christians serve in the armed forces, and believe that Jesus' teachings on peace apply to society, and not world conflict. They are called combatants – they believe it is better to fight against evil and make the world a better place. Some Christians believe war is right, although they are not willing to fight in combat. These people (non-combatants) would rather help out in practical ways e.g. working as a medic or driving trucks. There are some Christians called, "Quakers", who believe all violence is against God's wishes. They are also called Pacifists, or conscientious objectors. They refuse to fight in the army and say the Spirit of Jesus could never move people to fighting a war because the teachings of Christ are about love.

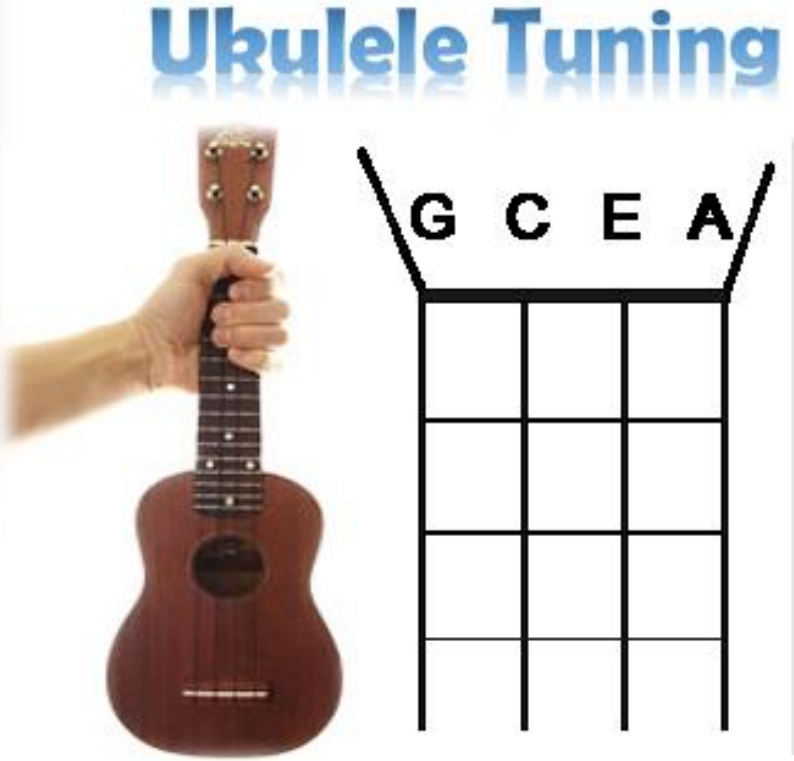
Activity:

Compare different religious beliefs regarding conflict. Have these changed over time?

Year 9 Music Knowledge Organiser







World Music

Samba Music

- Originates from Brazil and is often played at carnivals and festivals
- Can have up to 2000 people in a band, all playing percussion instruments whilst marching to stay in time
- Uses polyrhythms and a fast tempo

American Music

- Often referred to as Country and Western Music, it relies heavily on guitars and drums
- Often patriotic, religious and deals with adult content
- Repetitive and easy chords but with strong melodies and lyrics

Chinese Music

- The most recognisable feature of Chinese music is the use of the pentatonic scale, which uses all the black keys on a western keyboard.
- It usually uses flutes, stringed instruments, cymbals and gongs
- The music is soothing, played at a rubato tempo and is meant to reflect nature

Bhangra Music

- Bhangra is a fusion of traditional Indian Raga music and British influences.
- It developed in the underground party scene of Indian and Pakistani immgrants who had moved to the UK in the 1970/80's
- It uses music technology and traditional singing styles and raga scales

Modern British Music

- Famous British artists and bands include The Beatles, Oasis, Rolling Stones, Queen, Elton John and Coldplay
- Grunge, grime, dubstep, punk, soft rock are all subgenres of British music
- Often have eccentric personalities and unique singing styles

Reggae Music

- Originates from Jamaica in the 1960's
- Uses syncopation (off-beat) and a rock-steady tempo
- Bob Marley was the King of Reggae music and made it famous worldwide
- Uses instruments such as drums, guitars, keyboards and trumpets

Songwriting

1) Decide on the structure on your song using introductions, verses, choruses and bridges
2) Choose your chord progression for each section
3) Add a single melody line to each section using improvisation before settling on a repeating pattern that can be altered slightly in pitch or reversed to add contrast and interest
4) Add harmony using appropriate intervals
5) Add lyrics
6) Finally, choose which instruments to use in your arrangement

Common Chord Progressions

Major Keys: C, D, F, G & A

I	IV	V
C	F	G
D	G	A
F	Bb	C
G	C	D
A	D	E

I	vi	IV	V
C	Am	F	G
D	Bm	G	A
F	Dm	Bb	C
G	Em	C	D
A	F#m	D	E

ii	V	I
Dm7	G7	Cmaj7
Em7	A7	Dmaj7
Gm7	C7	Fmaj7
Am7	D7	Gmaj7
Bm7	E7	Amaj7

I	vi	ii	V
C	Am	Dm	G
D	Bm	Em	A
F	Dm	Gm	C
G	Em	Am	D
A	F#m	Bm	E

I	V	vi	IV
C	G	Am	F
D	A	Bm	G
F	C	Dm	Bb
G	D	Em	C
A	E	F#m	D

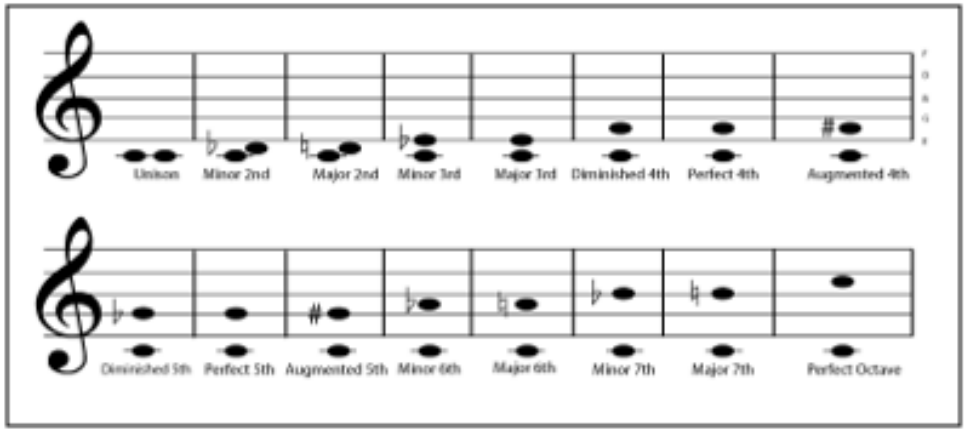
I	IV	vi	V
C	F	Am	G
D	G	Bm	A
F	Bb	Dm	C
G	C	Em	D
A	D	F#m	E

I	iii	IV	V
C	Em	F	G
D	F#m	G	A
F	Am	Bb	C
G	Bm	C	D
A	C#m	D	E

I	IV	I	V
C	F	C	G
D	G	D	A
F	Bb	F	C
G	C	G	D
A	D	A	E

I	IV	ii	V
C	F	Dm	G
D	G	Em	A
F	Bb	Gm	C
G	C	Am	D
A	D	Bm	E

www.piano-keyboard-guide.com



Going the extra mile activities.
Here are some great ideas to do with family to avoid boredom that go above and beyond during the next half term.

The Arts	IT	DT	English and Drama	Humanities	PE	Maths	Science
Create a Christmas play for you and your friends to work on over the internet. Make it hilarious.	Write a pseudocode/Python program that prints the times table for any number entered by the user. You will need two variables 1 will be typed in by the user.	Research what different kinds of materials roofers use. Why do we often have slate tiles on our roof? What is the point of gutters?	Watch one of the briefings by the government. What makes a good information giving speech? How is it being delivered? Make your own.	Create a detailed plan to make the world more economically equal when we are all back to normal. Share it with anyone you can get to listen.	Invent a new sport.	Explain what a square root is to someone really not mathematical.	Use equipment in your home to get salt out of salty water. How could we get water from salt water?
Develop an observational humour stand up show. Watch how comedians tell a story. Think about their delivery and how they make it look like they have just had that thought. Try it.	How can the school improve the student and staff use of Office 365? Create a 1 page summary of the improvements you made.	Design a meme about increasing social interactions during social isolation. Make it funny and informative.	Devise a political protest speech outlining your objection to something political e.g. children's suffrage or the tyranny of schooling.	In 1917 Russia had a great revolution. What would a great revolution look like in 2027? What would be the similarities and differences if Year 9 were in charge?	Create a set of rules.	Where can we find the Fibonacci sequence in nature? Do some research!	Find out how the brain remembers things.
Watch a performance by an artist you love – many are on Instagram or YouTube. Evaluate the difference between a live performance and a studio edit.	Design a new computer game. What would be the features? How would it work?	Create a village. Any media. Make sure the village has a wide range of housing.	Think about the points that agree and disagree with the following statement: There should be no democracy. We should have an overlord who makes all the decisions.	Why are we fascinated by crime? What makes Jack the Ripper such an interesting topic? Find out why if you can!	Get family members to play.	Pick any number. If that number is even, divide it by 2. If it is odd multiply it by 3 and add 1. Repeat the process. Every time you end up with 1. Why?	Over the past 20 years there has been tremendous research done on the origin of homo sapiens and other human species. Find out about it because your parents never learned it at school!
Make a playlist that means something to you. Share it with friends and explain why it matters to you.	Think about how we can avoid mental health problems and remain connected online. Explain it to your family and make a plan.	Invent a new sauce for chips or burgers. Test it. How could you bring it to market?	Think about a film you have watched recently. Imagine you had control of the story from half way through. How would you develop it?	How can we be greener as a society using technology? Create an infomercial advertising a product.	Send it to the organisers of the Quarantine Olympics to include it in the next games!	What is the shortest journey that goes to all these places in any order. York, Ipswich, London, Bristol, Leeds, Norwich, Oxford?	Sir Isaac Newton and Paul Dirac are two eminent British scientists. What did they do?