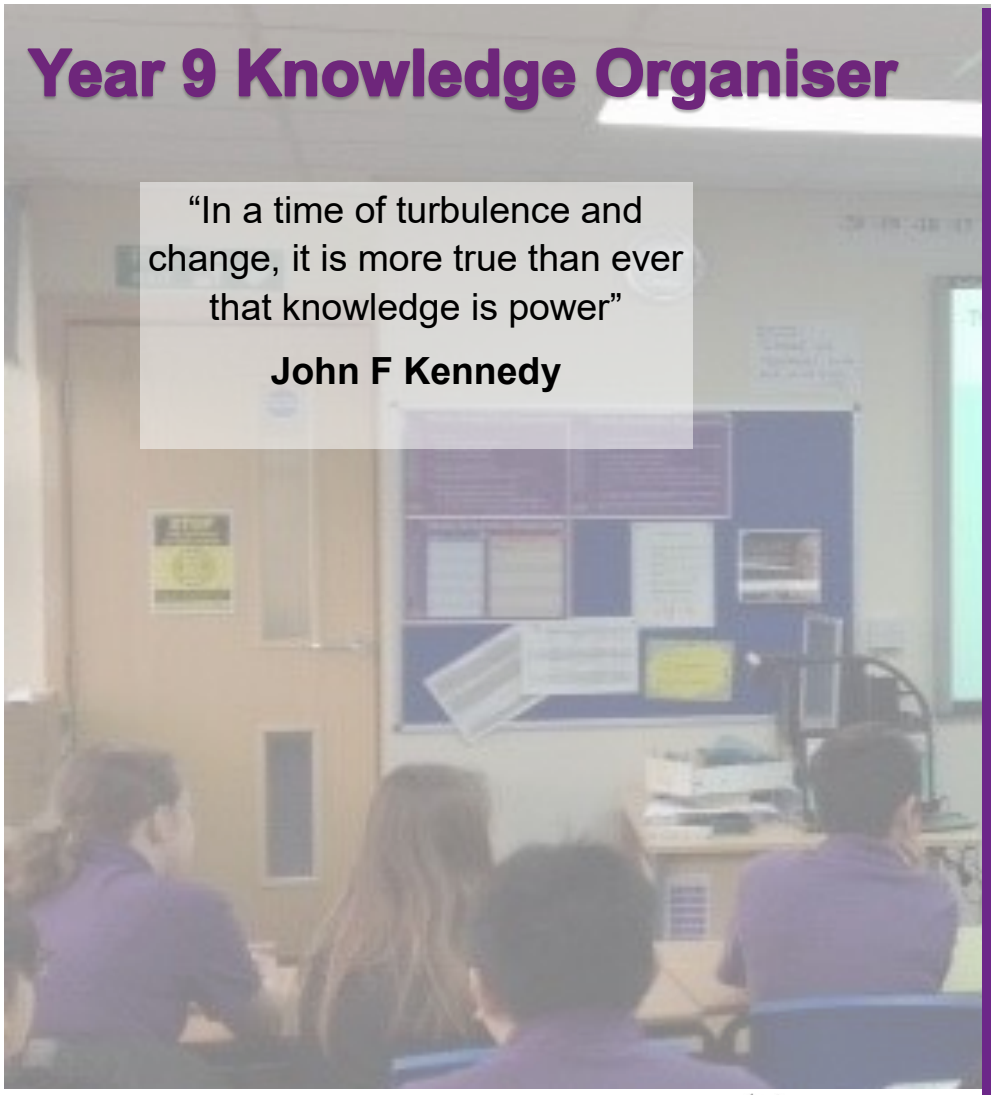
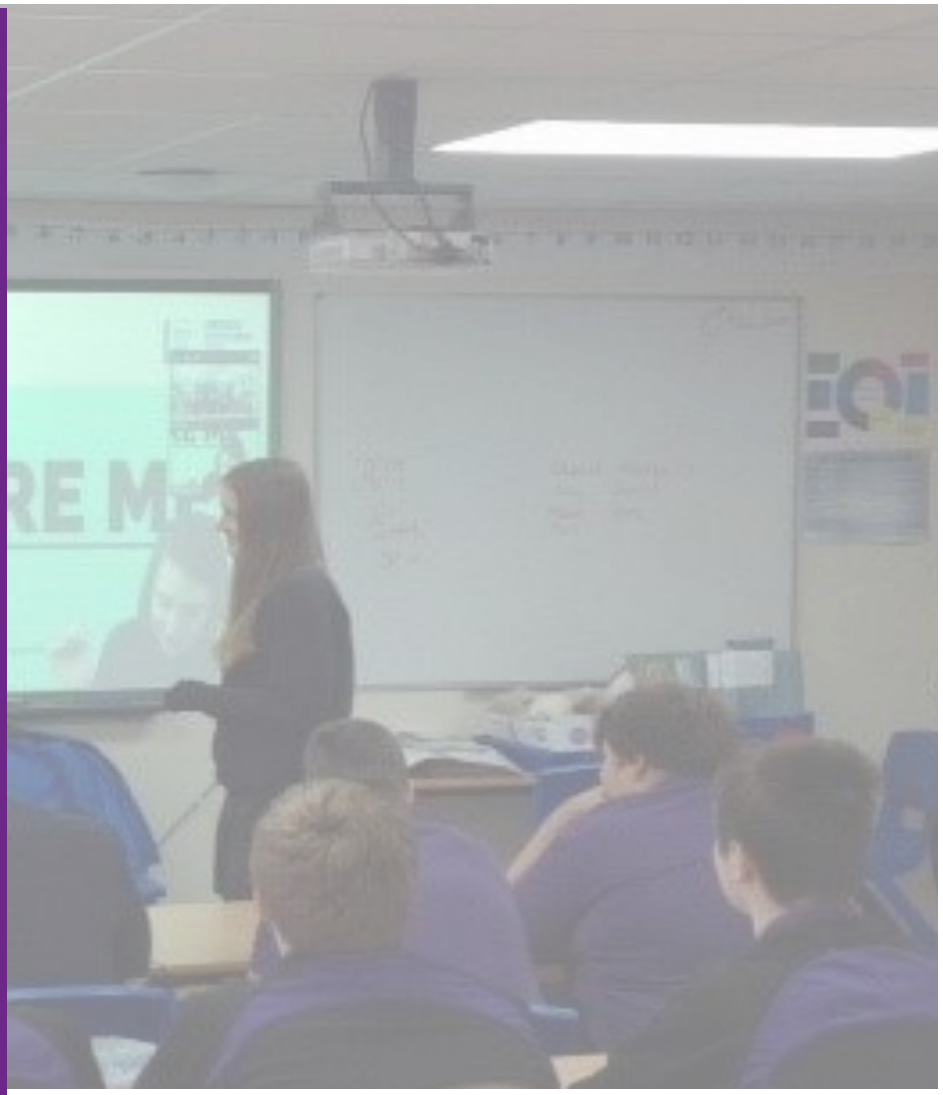
# Year 9 Knowledge Organiser



"In a time of turbulence and change, it is more true than ever that knowledge is power"

**John F Kennedy**

# Autumn 2



**Buckler's Mead Academy**

***Inspiring Education for All***

**Name:**

**Tutor:**

***Ready, Responsible, Respect***

# How to use your knowledge Organiser

**Self –Quizzing.**

Your Knowledge Organiser contains all of the key information you need to know for each subject area.

Your Knowledge Organiser will allow you to revise this key information and make sure it is stored and retrieved from your long-term memory.

The best way to use this resource is by self-quizzing through the **"look, cover, write and check"** method.

**First** Look through and read the information on a section of your knowledge organiser.

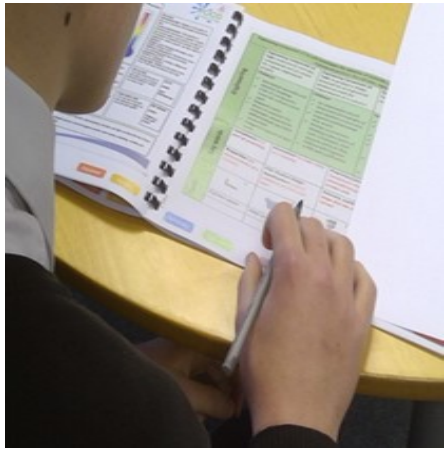
**Then** Cover the section so you can no longer see the information.

**Next** Try and **write out or mind map** the key definitions or facts that you need to know.

**Now** Uncover the section of your Knowledge Organiser and check how correct you were.

**Finally** Correct anything that you wrote down that was incorrect.

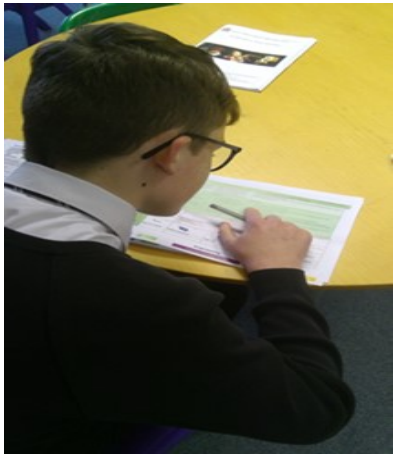
**Look**



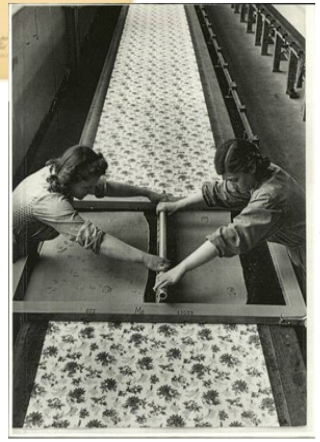
**Cover**

**Write**


**Check**



**E.A. Seguy** was an **artist and designer** active in Paris during the first three decades of the 20 th century.



Eugene Séguy was a French entomologist / artist who specialised in Diptera. He held a chair of entomology at the Muséum national d'histoire naturelle in Paris from 1956 to 1960. He is also known for establishing the Diptera section at that museum. Most of his artworks were created using the Pochoir technique, which is a type of hand-stenciling used in order to produce fine prints in limited editions.


Y9



**Art & Photography**

# R.E: CHRISTIANITY – THE BIBLE KNOWLEDGE ORGANISER

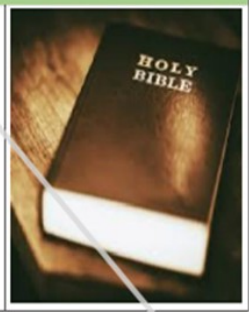
## Overview

-The Bible is the holy book of Christianity. It is not written by one author, but rather is a collection of 66 different books within one volume.

-The Bible is divided into two parts: The Old Testament (which contains 39 books) and The New Testament (with 27 books).

-The Old Testament has the same content as the Jewish Tenakh. It mainly discusses creation and God's early relationship with the Jews.

-The New Testament mainly covers the life of Jesus, his followers, and early Christian communities.




## The Importance of the Bible for Christians

Christians refer to the Bible as the word of God.

-Some take the words in the Bible as God's actual words, whilst others consider the Bible as the words of those inspired by God.

-Likewise, some Christians take every word in the Bible as though they are literally true, whilst others think that parts are figurative (not meant to be taken literally, but make a point). Whatever their outlook, all Christians agree that the Bible inspires and educates them in how they should live their lives.

**Anglican Churches**

In Anglican Churches, the Bible is placed on a lectern. The lectern is often shaped like an eagle – just as eagle soars and inspires, the Bible inspires people as it is read from the lectern to those in the church.

**Catholic Churches**

In Roman Catholic churches, the Bible is carried in procession (a ritual of a group of people moving forwards together) before it is read. This helps to show the respect that is held for the Bible and its words.

## Key Vocabulary

Christianity
Bible
Jesus
Sacred
Testament
Gospels
Apostle
Literal
Figurative
Anglican
Catholic
Creation
Genesis

## Content of the Bible

### The Old Testament

-The Old Testament is made up of several sections:

-Law is the first five books (Genesis to Deuteronomy). These are not 'laws' in the modern sense, but stories and ideas about how life should be lived.

-History contains the books of Joshua to Esther. This has twelve books which look at the history of the land of Israel.

-Wisdom is the book of Jobs to the Song of Songs. The Wisdom section contains 'intelligent' ideas about how life should be lived.

-Prophets contains the books of Isaiah to Malakai, and contains information about inspired preachers and teachers of God.

### The New Testament

-The New Testament contains the four gospels of Matthew, Mark, Luke & John. These contain the main records of the life & teachings of Jesus.

-The New Testament also contains that Acts of the Apostles, which were also written by Luke. This tells of how the actions of Jesus' followers after his death and resurrection led to the formation of the Christian Church.

-Finally, it contains the 21 Epistles (letters) written by Paul and the Book of Revelation, written by St. John the Divine. This discusses the end of the world.

## The Creation Story

This is the sequence of events from the creation story at the beginning of Genesis 1:

First Day: God made day and night.
Second Day: God made the sky, oceans & land.
Third Day: God made all kinds of plants.
Fourth Day: God made the Sun and the Moon.
Fifth Day: God made water & sky creatures.
Sixth Day: God created the other animals. He made humans to rule over the Earth.
Seventh Day: God finished his work and rested. He blessed the Seventh Day as a special day.

## Personal Spirituality – Key Questions

What books and stories are important to you?
What lessons have you learnt from stories?
What books and stories are important in your communities?
What key events have happened in your life?
How would you like your life story to be told?
How can we contribute to our own life stories?
Can we interpret the same stories in different ways?
What are your favourite features of the natural world?
How does the natural world make you feel?



# ISLAM KNOWLEDGE ORGANISER

## Overview

**Islam** is one of the world's major religions. It is the **world's 2nd largest religion**, with about 1.8 billion followers.

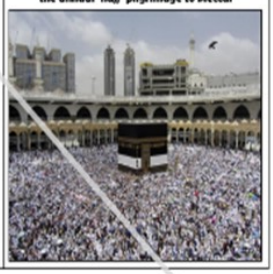
**Muslims** are the people who follow Islam. They believe in one **God** who created everything – he is called **Allah** (the Arabic name for 'God').

Muslims believe in a messenger of Allah, named **Muhammad.** They view him as the final **prophet,** following Adam, Abraham, Moses, Jesus and others.

Muhammad is believed to be the person who **founded** the faith of Islam, about 1,400 years ago.

The holy book in Islam is called **the Qur'an. A mosque** is a building designed for Muslim worship.

**Around 2.5 million Muslims each year take part in the annual 'hajj' pilgrimage to Mecca.**



## Answers to Important Questions and Key Vocabulary

**Where do Muslims worship God?**

-Muslims pray in a building called a mosque.
-The word for mosque in Arabic is 'masjid.' Most masjids have at least one dome, and many also have one or two towers.
-Muslims take off their shoes before entering the mosque to pray. This is a sign of respect.
-On Fridays at noon, the most important religious service of the week is held in the mosques.

**What is the Qur'an?**

The Qur'an is the holy book of Islam. Muslims believe that the Qur'an contains the holy words of God, which teaches them the right path. Other important books in Islam are the Sunnah (about Mohammad's life) and the Hadith (the words of Mohammad).

**Where do most Muslims live in the world?**

-There are about 50 countries around the world in which Islam is the largest religion.
-The Arab world (the Middle East and Northern Africa) accounts for about 20% of all Muslims.
-There are also millions of Muslims from Indonesia, Pakistan, Bangladesh and India.
-China, Iran and Turkey also have many Muslims.
-After Christianity, Islam is the 2nd largest religion in most European countries.

**How many different types of Muslims are there?**

-There are two main types of Muslims – Sunni Muslims and Shia Muslims. Although all Muslims follow the Qur'an and the five pillars of Islam, they also have some differences. Sunni Muslims believe that leadership of the community (and the 'caliph' – leader) should be elected from the community. Shia believe that leadership should stay within the prophet's family, or be chosen by Allah.

## Key Vocabulary

Allah
Muhammad
Qur'an
Five Pillars
Ramadan
Eid
Mosque
Prophet
Hadith
Sunni
Shia
Caliph

## Muslim Beliefs

### Laws and Customs

-There are many laws and customs outlined in the Qur'an, that Muslims should follow.

-They must dress modestly, e.g. many Muslims wear long clothes that cover their bodies, and women wear a hijab which covers parts of their hair/face. Food must be halal, meaning animals must be killed in a certain way.

### Ramadan

-Ramadan is the ninth month of the Islamic calendar. It is a month in which Muslims worldwide take part in fasting.

-For the whole of the month, Muslims do not eat during daylight hours. Instead, they devote themselves to prayer and to Allah.

### The Five Pillars of Islam


-The Five Pillars of Islam are the behaviours and beliefs by which Muslims must live their lives. They were founded in the hadith of Gabriel.

1.Shahadah: the declaration of faith: 'There is no God but Allah, and Mohammad is his messenger.' 2. Salah: the five daily prayers. 3. Zakah: Giving money to help the poor. 4. Sawm: Committing to fasting during the month of Ramadan. 5. Hajj: A religious pilgrimage to Mecca that Muslims should undertake at least once in their lives.

### Muhammad

- Muslims believe that God sent his final message to Earth through Muhammad, 1400 years ago. He is considered so holy that Muslims say 'peace be upon him' whenever they say or write his name.

-When he was around 40 years old, Muhammad is believed to have been approached in a cave by the angel Gabriel, who sent 'revelations' from Allah. He continued to receive these messages, and to teach them to others.

-The messages that Muhammad received were later collected and made into the Qu'ran. Muslims believe that they should follow the example set by Muhammad throughout their own lives.

## Top 10 Facts!

1. Friday is the Muslim holy day. People go to the Mosque and pray.
2. Islam is the fastest-growing religion in the world.
3. Muhammad was born in Mecca – which is now in Saudi Arabia. It is considered a holy place.
4. The very first mosque was in the courtyard of the home of the prophet Muhammad.
5. The Ka'ba is an ancient shrine in Mecca that Muslims believe is the holiest place on earth.
6. Muslims believe that Allah told Muhammad exactly what to write in the Qur'an.
7. The Qur'an has a total of 144 chapters. Many Muslims try to memorise the entire Qur'an!
8. Muslims are called to prayer by a muezzin, a man who sings through a loudspeaker.
9. About 23% of the global population are Muslim.
10. The 'Islamic World' refers to the Middle East, North Africa, and parts of South East Asia.

## Islam Timeline

Beginning of time: Allah creates the world and everything in it.
Around 570CE: Muhammad is born in Mecca.
c.610CE: Muhammad receives the first revelation from Gabriel.
c.622CE: Muhammad reaches Medina. Beginning of Islamic calendar.
c.630CE: Muhammad returns to Mecca. People accept Islam.
c.633CE: Muhammad dies. Abu-Bakr made caliph (leader).
c.655CE: Islam spreads from the Middle East through North Africa.
c.1120CE: Islam spreads to South East Asia.
1979CE: Iranian Revolution forms state of Iran – first attempt at an Islamic state.

Computing

# 9.1: Ciphers and Encryption

**Ciphers** are ways that messages can be hidden so that only the person you want to read them can.

There are a number of different types of cipher

**Caesar cipher**– Where each letter is shifted a certain number of spaces along . The weakness is that once you work out 1 of the letters, the others are all easy to work out.

**Substitution cipher**– This is like the Caesar cipher but instead of shifting the letters, they are muddled up. This means that to crack the code, you need o work out all of the letters

**Pig Pen Cipher**– Is a type of substitution ciphers where instead of replacing the leters with other leters, they are replaced with shapes. His makes it much harder to crack

One of the key ways of cracking a cipher is to use **letter frequency analysis**. This uses the frequency with which letters occur in normal writing to try and predict what the coded message will be. For exam-

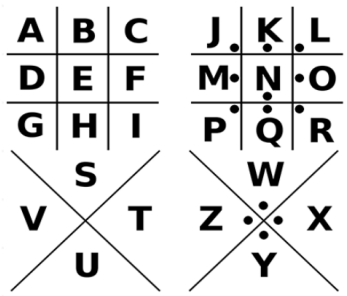
**Encryption** is the process that computers use to protect our data. Every time you send something over the internet, the information is encrypted to stop anyone else from reading it.

Encryption uses public and private keys to 'lock' messages up.

Encryption is needed so that messages that are sent across a network can not be intercepted.

**Symmetric encryption** uses one public key to encrypt and decrypt messages. The weakness with this is that if a hacker can get hold of the key then they can read your messages.

**Asymmetric encryption** uses a public key to encrypt the document




Caesar Cipher generator


Secure messages using **H**yper **T**ext **T**ransfer **P**rotocol **S**e-

## Key Terms-

**Cipher**– A set of steps to encode a message

**Encryption**– A mathematical way of scrambling a message

**Letter frequency analysis**– How often each letter appears in normal writing

**Symmetric encryption** – Encrypting and decrypting a message with one key

**Asymmetric encryption**- Encrypting and decrypting a message with two

There are two types of polymers….

1) **Thermoplastics also known as thermoforming** - these are types of plastics that are formed by heat and can be reformed

2) **Therosetting plastics** - plastics that once formed or set, cannot be reheated and reformed. If you heat them they either catch fire or go into a blob. They can be recycled by chopping them up and by pushing the pieces together by press forming into sheets

**Vacuum forming** is a technique that is used to shape a variety of plastics. In school it is used to form/shape thin plastic, usually plastics such as; polythene and perspex.

Vacuum forming is used when an unusual shape like a 'dish' or a box-like shape is needed. Many everyday items have been vacuum formed and some food products are packaged in vacuum formed materials.

**What is Memphis?** Memphis is one of the most instantly recognisable design styles. It's known for its use of bright neon, primary and pastel colours, geometric shapes, and bold, repetitive patterns.

**What era does it belong to?** Memphis Style is a mish-mash of various design styles that were popular during the 1980s

**What are its key characteristics?** A flat, vectorised style that is often accented with bright, saturated colour choices.

**Can you name one of the main designers of this design movement?** In the early 80s, Italian designer and architect **Ettore Sottsass** founded Memphis, a group of artists and designers who became known for their bright and bold furniture design.

**Thermoplastic**

Acrylic - This is the most common plastic in a school workshop. It is purchased usually in the form of sheets and comes in a range of colours. It is resistant to most acids and weather conditions.

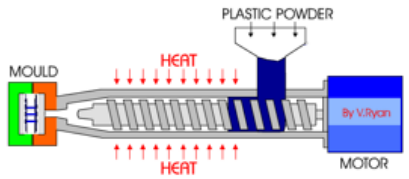
Polythene - Can be moulded into almost any form due to its excellent moulding qualities. Used for the production of bottles, bowls, toys, tube etc.

**Thermosetting**

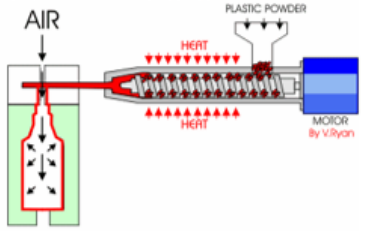
**Melamine Formaldehyde** - Used in the production of plastic laminates because of its smooth surface and hygienic qualities. Also used in electrical plugs and sockets because it can be cast and it is an excellent insulator.

**Urea Formaldehyde (UF):** Has physical properties of high hardness and high toughness, making it suitable for strong, knock-resistant electrical fittings. It is also scratch resistant and a very good electrical insulator, making electrical fittings manufactured from this polymer safe to use.

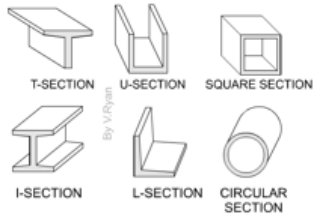
**Injection moulding of plastics**




**Blow moulding of plastics**




**Example of shapes which have been extruded**




**Design Considerations**

**Aesthetics:** What does is look like – colour/texture/ shape?

**Ergonomics**: Using anthropometric data to ensure the product and users fit together well.

**Environment:** Considering the impact of the product on the environment from material extraction to end-use

**Materials:** What material/s is it made out of? Why?

**Function:** What is the purpose of the product? What does it do? How does it do this?

## Knowledge & Understanding:

**Verbatim:** is a form of documentary theatre in which plays are constructed from the precise words spoken by people interviewed about a particular event or topic.

**Acting for the Screen, acting for the Stage.**

**Creative Intentions:** your creative vision for your work.

**Roles & Responsibilities in Theatre:** Roles such as director; actor; designer; writer; dancer; singer; choreographer.

**Classical Acting Technique:** an umbrella term for different acting techniques used together. It encompasses the use of the whole body, the full range and quality of the voice, the actor's imagination, the actor's ability to personalize, improvise, use external stimuli, and **analyse scripts**.

**Method Acting Technique**: describes a range of **training and rehearsal techniques** that seek to encourage sincere and emotionally expressive performances.

## DRAMA STRATEGIES:

**Voice-Over:** Narration heard over what is seen on stage.

**Tableaux:** participants make still images with their bodies to represent a scene. A tableau can be used to quickly establish a scene that involves many characters.

At this point, thought tracking can be used to find out more about each of the characters.

**Soundscape**: Using voices or body percussion to create (like a landscape, only in sound) a particular theme or mood. e.g., the city at night

**Soliloquy:** act of speaking one's thoughts aloud when by oneself or regardless of any hearers.

**Flashback/Flash Forwards:** improvised scenes which take place seconds, minutes, days, or years before or after.

**Choral Speech:** Speaking or chanting at the same time

**Thought-Tracking:** Speaking aloud the thoughts or feelings of a character in a freeze-frame.

**Still Image/freeze frame:** It is like pressing the pause button on a remote control, taking a photo, or

## KEY WORDS OR PHRASES:

**Style and Form:** the methods used to tell a story i.e. mime or physical theatre.

**Non-Naturalistic:** where no-one is pretending that what is happening on stage is realistic. Non- naturalistic techniques include slow motion & Soundscape

**Physical Theatre:** theatre which emphasizes the use of physical movement, as in dance and mime, for expression.

**Symbolism:** Symbolism in terms of theatre can be done with colour, movement, characters, props, and costumes. (The symbol can bring about greater meaning than any literal suggestion and can usually be used to represent something different than what you will see at face value.)

**Naturalism:** theatre that attempts to create an illusion of reality through a range of dramatic and theatrical strategies

**Protagonist:** Main character in a play

**Antagonist:** opponent or foil of the main characters

**Proscenium Stage**

**Traverse Stage**

**Theatre-in-the-Round**

**Promenade Theatre**

Romeo and Juliet Knowledge Organiser

| Key Vocabulary and Definitions: Etymology (OE- Old English, F-French, L- Latin, G- Germanic, AG – Ancient Greek, N - Norse | | |
|---|---|---|
| apothecary | a health professional trained in the art of preparing drugs | G *apothēkē* 'storehouse'. |
| baleful | threatening or foreshadowing evil or tragic developments | OE *bealu* meaning evil |
| bawdy | humorously vulgar | F *baude* meaning shameless |
| benefice | an endowed church office giving income to its holder | L *bene* meaning well' and *facere* 'do'. |
| beshrew | wish harm or evil upon | OE beschrewen meaning to curse, pervert |
| caitiff | a cowardly and despicable person | L *captivus* to be taken captive |
| dirge | a song or hymn of mourning as a memorial to a dead person | L *dirige* meaning direct! |
| doublet | a man's close-fitting jacket, worn during the Renaissance | OF something folded |
| ducat | formerly a gold coin of various European countries | Italian *ducato*, silver coin minted by the Duke of Apulia in 1190 |
| effeminate | having unsuitable feminine qualities | L femina meaning woman |
| feign | make believe with the intent to deceive | L *fingere* meaning mould, contrive' |
| forsooth | an archaic word originally meaning 'in truth' but now usually used to express disbelief | L soth meaning genuine and true |
| heretic | a person whose religious beliefs conflict with church dogma | G *hairetikos* meaning to be able to choose |
| inauspicious | boding ill | L auspex meaning "bird seer". The English noun auspice, which originally referred to this practice of observing birds to discover omens, also comes from Latin auspex. |
| intercession | the act of intervening, as to mediate a dispute | L *inter*, between and *cedere* to go. |
| jocund | full of or showing high-spirited merriment | L juvare to delight |
| lamentation | the passionate activity of expressing grief | L *lamenta* (plural) 'weeping, |
| lineament | the characteristic parts of a person's face | L lineamentum, from linea (line). |
| penury | a state of extreme poverty or destitution | L *penuria* 'need, scarcity'; |
| sententious | concise and full of meaning | L *sententiosus*, from *sententia* 'opinion' |

Spellings: Shakespeare, champion, immature, chastise, conjecture, bachelor, questionable, pasteurised, future, exhaustion, questionnaire, conjecture, heroine, tragedy, prologue, dialogue, playwright

| SPaG Focus | |
|---|---|
| Etymology | The study of the origin of words and the way in which their meanings have changed throughout history. |
| Prefix | A word, letter, or number placed before another. |
| Suffix | A morpheme added at the end of a word to form a derivative. |
| Homophones | each of two or more words having the same pronunciation but different meanings, origins, or spelling, for example new and knew. |
| Homonyms | each of two or more words having the same spelling or pronunciation but different meanings and origins. |

| Themes |
|---|
| Tragedy, love stories, destiny, fate, metaphysical world, free will, fatal flaw. |

| Roots and Stems |
|---|
| Fore—before |
| Homo— the same |

| Terminology | |
|---|---|
| Acts | a major unit or division of a play. |
| Stage directions | instructions in the script that tell the actors what to do and where to move on stage. |
| Soliloquy | a speech in which an actor, usually alone on stage, speaks the inner thoughts of his/her character aloud. |
| Monologue | a long speech made by one actor; a monologue may be delivered alone or in the presence of others. |
| Characterisation | the creation or construction of a fictional character. |
| Imagery | Imagery is language used by writers to create images in the mind of the reader. |
| Metaphor | a figure of speech in which a word or phrase is applied to an object or action to which it is not literally applicable. |
| Personification | the attribution of a personal nature or human characteristics to something non-human. |
| Connotation | an idea or feeling which a word invokes for a person in addition to its literal or primary meaning. |
| Dramatic Irony | When the audience perceives something that a character does not know, that is dramatic irony. |

**Context**

**Tragedy** is a serious play or drama typically dealing with the problems of a central character, leading to an unhappy or disastrous ending brought on, as in ancient drama, by fate and a tragic flaw in this character, or, in modern drama, usually by moral weakness, psychological maladjustment, or social pressures.

The prologue introduces the theme of **fate** when the lovers are called star-crossed and death-marked. This means that the events of their lives, and their deaths, are somehow already decided. The Metaphysical world is derived from the Greek meta ta physika ("after the things of nature"); referring to an idea, doctrine, or posited reality outside of human sense perception. In modern philosophical terminology, metaphysics refers to the studies of what cannot be reached through objective studies of material reality. A **hamartia** is a fatal flaw leading to the downfall of a tragic hero or heroine.

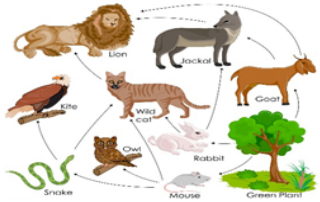
# Year 9 Topic 2- Ecosystems

## What is an Ecosystem?

**An ecosystem is a system in which organisms interact with each other and with their environment.**

### Ecosystem's Components

| | |
|---|---|
| **Abiotic** | These are **non-living**, such as air, water, heat and rock. |
| **Biotic** | These are **living**, such as plants, insects, and animals. |
| **Flora** | **Plant life** occurring in a particular region or time. |
| **Fauna** | **Animal life** of any particular region or time. |




### Food Web and Chains

Simple **food chains** are useful in explaining the basic principles behind ecosystems. They show only one species at a particular trophic level. **Food webs** however consists of a network of many food chains interconnected together.

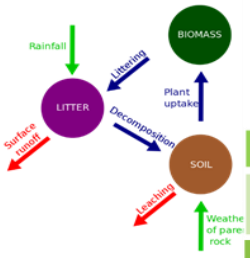
## Biome's climate and plants

| Biome | Location | Temperature | Rainfall | Flora | Fauna |
|---|---|---|---|---|---|
| **Tropical rainforest** | Centred along the Equator. | Hot all year (25-30°C) | Very high (over 200mm/year) | Tall trees forming a canopy; wide variety of species. | Greatest range of different animal species. Most live in canopy layer |
| **Tropical grasslands** | Between latitudes 5°- 30° north & south of Equator. | Warm all year (20-30°C) | Wet + dry season (500-1500mm/year) | Grasslands with widely spaced trees. | Large hoofed herbivores and carnivores dominate. |
| **Hot desert** | Found along the tropics of Cancer and Capricorn. | Hot by day (over 30°C) Cold by night | Very low (below 300mm/year) | Lack of plants and few species; adapted to drought. | Many animals are small and nocturnal: except for the camel. |
| **Temperate forest** | Between latitudes 40°-60° north of Equator. | Warm summers + mild winters (5-20°C) | Variable rainfall (500-1500m /year) | Mainly deciduous trees; a variety of species. | Animals adapt to colder and warmer climates. Some migrate. |
| **Tundra** | Far Latitudes of 65° north and south of Equator | Cold winter + cool summers (below 10°C) | Low rainfall (below 500mm/ year) | Small plants grow close to the ground and only in summer. | Low number of species. Most animals found along coast. |
| **Coral Reefs** | Found within 30° north – south of Equator in tropical waters. | Warm water all year round with temperatures of 18°C | Wet + dry seasons. Rainfall varies greatly due to location. | Small range of plant life which includes algae and sea grasses that shelters reef animals. | Dominated by polyps and a diverse range of fish species. |

## Nutrient cycle

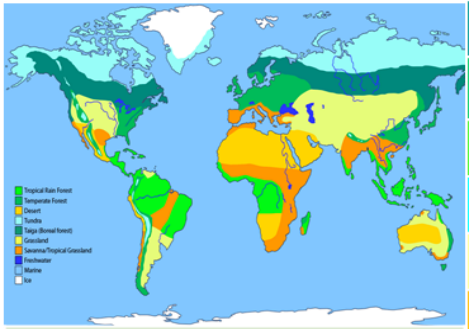
Plants take in **nutrients** to build into new organic matter. Nutrients are taken up when animals eat plants and then returned to the soil when animals die and the body is broken down by **decomposers**.

| | |
|---|---|
| **Litter** | This is the **surface layer** of vegetation, which over time breaks down to become **humus**. |
| **Biomass** | The total **mass of living organisms** per unit area. |




## Biomes

A biome is a **large geographical area of distinctive plant and animal groups**, which are adapted to that particular environment. The climate and geography of a region determines what type of biome can exist in that region.



- Coniferous forest
- Deciduous forest
- Tropical rainforests
- Tundra
- Temperate grasslands
- Tropical grasslands
- Hot deserts.

The **most productive biomes** – which have the greatest biomass- grow in climates that are **hot and wet.**

## Tropical Rainforest Biome

Tropical rainforest cover about **2 per cent** of the Earth's surface yet they are home to **over half of the world's plant and animals**.

## Interdependence in the rainforest

A rainforest works through **interdependence**. This is where the plants and animals **depend on each other** for survival. If one component changes, there can be **serious knock-up effects** for the entire ecosystem.


### Distribution of Tropical Rainforests

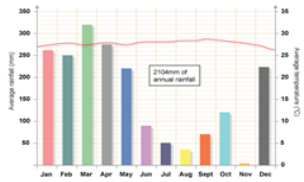
Tropical rainforests are **centred along the Equator** between the Tropic of Cancer and Capricorn. Rainforests can be found in South America, central Africa and South-East Asia. **The Amazon** is the world's largest rainforest and takes up the majority of northern South America, encompassing countries such as Brazil and Peru.

### Rainforest nutrient cycle

The **hot, damp conditions** on the forest floor allow for the **rapid decomposition** of dead plant material. This provides plentiful nutrients that are easily absorbed by plant roots. However, as these nutrients are in high demand from the many fast-growing plants, they do not remain in the soil for long and stay close to the surface. If vegetation is removed, the soils quickly become **infertile**.

### Climate of Tropical Rainforests

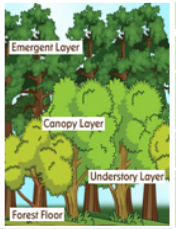
- Evening temperatures rarely fall below **22°C.**
- Due to the **presence of clouds**, temperatures rarely rise above **32°C**.
- Most afternoons have heavy showers.
- At night with no clouds insulating, temperature drops.




## CASE STUDY: UK Ecosystem: Epping Forest, Essex

This is a typical English lowland deciduous woodland. **70% of the area** is designated as a **Site of Special Scientific Interest (SSI)** for its biological interest, with **66 %** designated as a **Special Area of Conservation (SAC).**

| Components & Interrelationships | | Management |
|---|---|---|
| **Spring** | **Flowering plants** (producers) such as bluebells store nutrients to be eaten by consumers later. | - Epping has been managed for centuries.<br>- Currently now used for **recreation** and **conservation.**<br>- Visitors **pick fruit** and berries, helping to **disperse seeds.**<br>- Trees cut down to encourage **new growth for timber.** |
| **Summer** | Broad tree leaves grow quickly to **maximise photosynthesis.** | |
| **Autumn** | Trees shed leaves to **conserve energy** due to sunlight hours decreasing. | |
| **Winter** | Bacteria **decompose** the leaf litter, releasing the nutrients into the soil. | |




### Layers of the Rainforest

| | |
|---|---|
| **Emergent** | Highest layer with trees reaching **50 metres.** |
| **Canopy** | Most life is found here as It receives **70% of the sunlight** and **80% of the life.** |
| **U-Canopy** | Consists of trees that reach **20 metres high.** |
| **Shrub Layer** | Lowest layer with **small trees** that have adapted to living in the **shade.** |

# Year 9 Topic 3- Tropical Rainforests: Case Study Malaysia

**Malaysia is a LIC country is south-east Asia. 67% of Malaysia is a tropical rainforest with 18% of it not being interfered with. However , Malaysia has the fastest rate of deforestation compared to anywhere in the world**

## Adaptations to the rainforest

| | |
|---|---|
| **Drip Tips** | Allows heavy rain to **run off leaves easily**. |
| **Lianas & Vines** | **Climbs** trees to reach sunlight at canopy. |
| **Orangutans** | Large arms **to** swing & support **in the tree canopy.** |
| **Buttress Roots** | Helps support the base of the tree and transport water. |

## Rainforest inhabitants

Many tribes have developed sustainable ways of survival. The rainforest provides inhabitants with...

- **Food** through hunting and gathering.
- **Natural medicines** from forest plants.
- **Homes and boats** from forest wood.

## Issues related to biodiversity

### Why are there high rates of biodiversity?

- **Warm and wet climate** encourages a wide range of vegetation to grow.
- There is **rapid recycling of nutrients** to speed plant growth.
- Most of the rainforest is **untouched.**

### Main issues with biodiversity decline

- **Keystone species** (a species that are important of other species) are extremely important in the rainforest ecosystem. Humans are threatening these vital components.
- **Decline in species** could cause tribes being unable to survive.
- **Plants** & **animals** may become **extinct.**
- Key medical **plants** may become **extinct.**

## What are the causes of deforestation?

### Logging

- Most widely reported cause of destructions to biodiversity.
- Timber is harvested to create **commercial items** such as furniture and paper.
- **Violent confrontation** between indigenous tribes and logging companies.

### Agriculture

- Large scale **'slash and burn'** of land for ranches and palm oil.
- Increases **carbon emission**.
- **River saltation** and **soil erosion** increasing due to the large areas of **exposed land.**
- Increase in **palm oil** is making the **soil infertile**.

### Mineral Extraction

- **Precious metals** are found in the rainforest.
- Areas **mined** can experience **soil and water contamination**.
- **Indigenous people** are becoming **displaced** from their land due to roads being built to transport products.

### Tourism

- **Mass tourism** is resulting in the building of hotels in extremely **vulnerable areas**.
- Lead to **negative relationship** between the government and indigenous tribes
- Tourism has **exposed animals** to human **diseases.**

### Energy Development

- The **high rainfall** creates ideal conditions for **hydro-electric power (HEP).**
- The **Bakun Dam** in Malaysia is key for creating energy in this developing country, however, both people and environment have suffered.

### Road Building

- **Roads** are needed to bring supplies and **provide access** to new mining areas, settlements and energy projects.
- In Malaysia, logging companies use an **extensive network of roads** for heavy machinery and to transport wood.

## Impacts of deforestation

### Economic development

+ Mining, farming and logging creates employment and tax income for government.
+ Products such as palm oil provide valuable income for countries.
- The loss of biodiversity will reduce tourism.

### Soil erosion

- Once the land is **exposed by deforestation,** the soil is more **vulnerable to rain**.
- With **no roots to bind soil together**, soil can easily **wash away.**

### Climate Change

-When rainforests are cut down, the climate becomes **drier.**
-Trees are **carbon 'sinks'**. With greater deforestation comes more greenhouse emissions in the atmosphere.
-When trees are burnt, they **release more carbon in the atmosphere**. This will enhance the **greenhouse effect.**

## Sustainability for the Rainforest

**Uncontrolled and unchecked exploitation can cause irreversible damage such as loss of biodiversity, soil erosion and climate change.**

**Possible strategies include:**

- **Agro-forestry** - Growing trees and crops at the same time. It prevents soil erosion and the crops benefit from the nutrients.
- **Selective logging** - Trees are only felled when they reach a particular height.
- **Education** - Ensuring those people understand the consequences of deforestation
- **Afforestation** - If trees are cut down, they are replaced.
- **Forest reserves** - Areas protected from exploitation.
- **Ecotourism** - tourism that promotes the environments & conservation

# How did the end of WW1 impact votes for women?

## Key Figures

**Millicent Fawcett – Founder of suffragist movement**
**Emmeline Pankhurst - Founder of Suffragette movement**
**Emily Davidson – suffragette who jumped in front of kings horse at the derby and was seen as a martyr by the suffragettes**
**David Lloyd George – prime minister of Britain in 1919**
**Woodrow Wilson – President of USA in 1919**
**Georges Clemenceau – Prime Minister of France in 1919**






## Key Points

**Defence of the Realm Act** (1914) gave the government the ability to arrest anyone accused of helping the enemy and was used to prevent criticism of government.
Women had very little rights before 1900 as they could not vote.
The **suffragists** were created in 1897 by Millicent Fawcett. They were known for using peaceful methods such as petitions and speeches.
The **suffragettes** were founded by Emmeline Pankhurst in 1903 due to lack of results by the suffragists. They used extreme methods in order to gain publicity for their stunts and demonstrations to get their message across.
The two groups both generally supported women's role in the war and gained support for their cause because of this despite difference of approaches between the two groups.
**Treaty of Versailles** was a vital document blaming Germany for the outbreak of WW! And demanding they pay reparations to the allied countries for the damages caused. Many Germans were unhappy with this.

## Key Words

**Home front**: The situation of daily life at home during the war
**Censorship**: The restriction of information given to the public and restrictions on what could be said.
**Munitions**: Production of weapons and ammunition to use at war.
**Rationing**: Restriction of food to conserve supplies
**Democracy**: The rule of the people
**Reform**: changes to government policy
**Suffrage**: The right to vote
**Suffragists**: Peaceful group fighting for the women's vote
**Suffragettes**: An active and militant group fighting for the women's vote
**Martyr**: Someone who dies for their cause
**Treaty**: An agreement made by multiple countries to bring an and to a war.
**Reparations**: payments to cover damages from WW1
**Demilitarised zone**: an area of land that no military forces are allowed to be stationed in.
**League of Nations**: collection of countries to form an international alliance to prevent future wars and to discuss any issues.

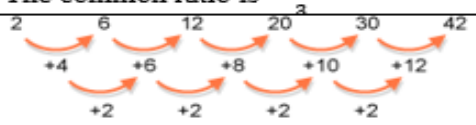
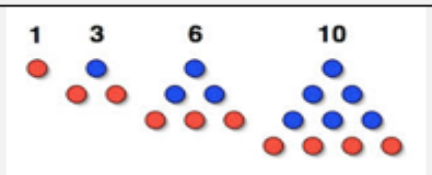
## Key Questions

How were protesters treated? Women who were arrested for protesting were imprisoned and in cases of those women who decided to go on hunger strike, were force fed and tortured.
When did women get the vote? Women were given the vote in Feb. 1918 providing they were over 30 and married or owned property. By 1928, all women were given the same voting rights as men.
Why was Germany unhappy with the Treaty of Versailles? - Many Germans still believed they had not lost the war and were betrayed by their own government after the Kaiser had abdicated to surrender. Others believed they were treated too harshly in the terms of the treaty

# Topic: Algebra – All groups

| 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<br>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'.**<br>Be careful with negatives.<br>$x^2$ and $x$ are not like terms. | $2x + 3y + 4x - 5y + 3 = 6x - 2y + 3$<br>$3x + 4 - x^2 + 2x - 1 = 5x - x^2 + 3$ |
| 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**.<br>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. |
| 12. Writing Formulae | **Substitute letters for words** in the question. | Bob charges £3 per window and a £5 call out charge.<br>$C = 3N + 5$<br>Where N=number of windows and C=cost |

| | | |
|---|---|---|
| 13. Substitution | **Replace letters with numbers.**<br>Be careful of $5x^2$. You need to square first, then multiply by 5. | $a = 3, b = 2$ *and* $c = 5$. Find:<br>1. $2a = 2 \times 3 = 6$<br>2. $3a - 2b = 3 \times 3 - 2 \times 2 = 5$<br>3. $7b^2 - 5 = 7 \times 2^2 - 5 = 23$ |
| 14. Quadratic | A quadratic expression is of the form<br>$ax^2 + bx + c$<br>where $a$, $b$ and $c$ are numbers, $a \neq 0$ | Examples of quadratic expressions:<br>$x^2$<br>$8x^2 - 3x + 7$<br>Examples of non-quadratic expressions:<br>$2x^3 - 5x^2$<br>$9x - 1$ |
| 15. Expanding Double Brackets | $(a + b)(a - b)$<br>Use **FOIL** or **2 way table** | **FOIL - First, Outer, Inner, Last**<br>Expand and simplify<br>$(x + 3)(x + 2) = x^2 + 2x + 3x + 6$<br>$= x^2 + 5x + 6$<br>Expand and simplify: (p + 4)(p – 2).<br>× \| p \| +4<br>p \| $p^2$ \| 4p<br>-2 \| -2p \| -8<br>Which simplifies to $p^2 + 2p - 8$. |
| 16. Factorising Quadratics | When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that **add to give b** and **multiply to give c**. | $x^2 + 7x + 10 = (x + 5)(x + 2)$<br>(because 5 and 2 add to give 7 and multiply to give 10)<br>$x^2 + 2x - 8 = (x + 4)(x - 2)$<br>(because +4 and -2 add to give +2 and multiply to give -8) |
| 17. Difference of Two Squares | An expression of the form $a^2 - b^2$ can be factorised to give $(a + b)(a - b)$ | $x^2 - 25 = (x + 5)(x - 5)$<br>$16x^2 - 81 = (4x + 9)(4x - 9)$ |
| 18. Changing the Subject of a Formula | **Use inverse operations** on both sides of the formula (balancing method) until you find the expression for the letter. | a Make $a$ the subject of the formula $v^2 = u^2 + 2as$<br>b Make $x$ the subject of the formula $y = \frac{ax + b}{c}$<br>a $v^2 = u^2 + 2as$<br>$v^2 - u^2 = 2as$ — Subtract $u^2$ from both sides.<br>$\frac{v^2 - u^2}{2s} = a$ — Divide both sides by 2s.<br>$a = \frac{v^2 - u^2}{2s}$ — Re-write in the form $a = \ldots$<br>b $y = \frac{ax + b}{c}$<br>$cy = ax + b$ — Multiply both sides by $c$.<br>$cy - b = ax$ — Subtract $b$ from both sides.<br>$\frac{cy - b}{a} = x$ — Divide both sides by $a$.<br>$x = \frac{cy - b}{a}$ — Re-write in the form $x = \ldots$ |

| | | |
|---|---|---|
| 1. Linear Sequence | A number pattern with a **common difference**. | 2, 5, 8, 11… is a linear sequence |
| 2. Term | **Each value** in a sequence is called a term. | In the sequence 2, 5, 8, 11…, 8 is the third term of the sequence. |
| 3. Term-to-term rule | A rule which allows you to **find the next term** in a sequence if you **know the previous term**. | First term is 2. Term-to-term rule is 'add 3'<br><br>Sequence is: 2, 5, 8, 11… |
| 4. nth term | A rule which allows you to **calculate the term** that is in the **nth position** of the sequence.<br><br>Also known as the 'position-to-term' rule.<br><br>**n** refers to the **position** of a term in a sequence. | nth term is $3n - 1$<br><br>The 100th term is $3 \times 100 - 1 = 299$ |
| 5. Finding the nth term of a linear sequence | 1. Find the **difference**.<br>2. **Multiply that by $n$.**<br>3. Substitute $n = 1$ to **find out what number you need to add or subtract to get the first number in the sequence.** | Find the nth term of: 3, 7, 11, 15…<br><br>1. Difference is +4<br>2. Start with $4n$<br>3. $4 \times 1 = 4$, so we need to subtract 1 to get 3.<br>nth term = $4n - 1$ |
| 6. Fibonacci type sequences | A sequence where the next number is found by **adding up the previous two terms** | The Fibonacci sequence is:<br>1,1,2,3,5,8,13,21,34 …<br><br>An example of a Fibonacci-type sequence is:<br>4, 7, 11, 18, 29 … |
| 7. Geometric Sequence | A sequence of numbers where each term is found by **multiplying the previous one** by a number called the **common ratio, r**. | An example of a geometric sequence is:<br>2, 10, 50, 250 …<br>The common ratio is 5<br><br>Another example of a geometric sequence is:<br>$81, -27, 9, -3, 1$ …<br>The common ratio is $-\frac{1}{3}$ |
| 8. Quadratic Sequence | A sequence of numbers where the **second difference is constant**.<br><br>A quadratic sequence will have a $n^2$ term. |  |
| 9. nth term of a geometric sequence | $ar^{n-1}$<br><br>where $a$ is the first term and $r$ is the common ratio | The nth term of 2, 10, 50, 250 …. Is<br><br>$2 \times 5^{n-1}$ |
| 10. nth term of a quadratic | 1. Find the first and second differences.<br>2. Halve the second difference and multiply | Find the nth term of: 4, 7, 14, 25, 40.. |
| | 3. Substitute $n = 1,2,3,4$ … into your expression so far.<br>4. Subtract this set of numbers from the corresponding terms in the sequence from the question.<br>5. Find the nth term of this set of numbers.<br>6. Combine the nth terms to find the overall nth term of the quadratic sequence.<br><br>Substitute values in to check your nth term works for the sequence. | Second difference = +4 → nth term = $2n^2$<br><br>Sequence: 4, 7, 14, 25, 40<br>$2n^2$ 2, 8, 18, 32, 50<br>Difference: 2, -1, -4, -7, -10<br><br>Nth term of this set of numbers is $-3n + 5$<br><br>Overall nth term: $2n^2 - 3n + 5$ |
| 11. Triangular numbers | The sequence which comes from a pattern of dots that form a triangle.<br><br>1, 3, 6, 10, 15, 21 … |  |

# Year 9 French Knowledge Organiser- TV/Cinema/Music. Christmas and Celebrations. Nov-Dec 2020

## Key Ideas

- La révision
- Le présent
- La télé et YOUTUBE
- Le cinéma
- La musique
- Noël en France et dans les autres pays
- Les traditions

## Key Vocabulary

| Les noms | |
|---|---|
| Une émission | A TV programme |
| Le petit écran/le grand écran | The TV/cinema screen |
| Un feuilleton | A soap |
| Une série | A series |
| Un documentaire | A documentary |
| La météo | The weather forecast |
| Les actualités | The news |
| La musique pop | Pop music |
| La musique rap | Rap music |
| La musique classique | Classical music |
| Le R n B | R n B |
| Le jazz | jazz |

| Key Phrases |
|---|
| Je préfère la musique pop parce que c'est….. |
| Les effets spéciaux étaient super |
| J'aime regarder les documentaires à la télé |
| Mon acteur/Mon actrice préféré (e) s'appelle…. |
| J'adore Noël parce que c'est….. |
| Le jazz m'énerve |
| Pour Noël on m'a offert un nouveau vélo |
| Pour célébrer le Nouvel An, je suis allé (e)en ville |
| J'ai mangé |
| .J'ai bu |
| J'ai reçu |

# Year 9 German TV/music/Cinema. Christmas and Celebrations. Year 9 German Knowledge Organiser Nov-Dec 2020

## Key Ideas

- Wiederholung
- Die Gegenwart
- Fernsehen und YOUTUBE
- Das Kino
- Die Musik
- Weihnachten in Deutschland und in den anderen deutschsprachigen Ländern
- Die Traditionen

## Key Vocabulary

| Die Nomen | |
|---|---|
| eine Sendung | A TV programme |
| der Fernseher/das Kino | TV/Cinema |
| eine Serie | A series |
| ein Dokumentarfilm | A documentary |
| das Wettervorhersage | The weather forecast |
| die Nachrichten | The news |
| Popmusik | Pop music |
| Rapmusik | Rap music |
| Klassische Musik | Classical music |
| R n B | R n B |
| Jazzmusik | jazz |

| Key Phrases |
|---|
| Ich höre lieber Popmusik, weil es.....ist |
| Die spezielle Effekte waren toll |
| Ich mag Dokumentarfilme im Fernsehen schauen |
| Mein Lieblingsschauspieler/meine Lieblingsschauspielerin heißt... |
| Ich liebe Weihnachten, weil es.....ist. |
| Die Jazzmusik geht mir auf die Nerven |
| Für Weihnachten habe ich ein neues Fahrrad bekommen |
| Für das Neujahr bin ich in die Stadt gegangen.... |
| Ich habe.....gegessen |
| Ich habe.....getrunken |
| Ich habe.....bekommen |

**KS3 Spanish - Knowledge Organiser - Autumn 1**

| **1: Alphabet and Phonics** | | **3: Asking somebody their age** | | **4: When is your birthday?** | | **5: Do you have siblings?** | |
|---|---|---|---|---|---|---|---|
| Key sounds | Pronunciation | English | Spanish | English | Spanish | Spanish | English |
| a, b, c, d | ah, beh, theh, deh | 1 | uno | 16 | dieciséis | Tengo un hermano | I have a brother |
| ll | y | 2 | dos | 17 | diecisiete | Tengo una hermana | I have a sister |
| ñ | ny | 3 | tres | 18 | dieciocho | Tengo dos hermanos | I have two brothers |
| ci (i) | thee (ee) | 4 | cuatro | 19 | diecinueve | Tengo tres hermanas | I have three sisters |
| ce (e ) | theh (eh) | 5 | cinco | 20 | veinte | No tengo hermanos | I don't have siblings |
| co | koh | 6 | seis | 21 | veintiuno | **TASK 6: translate the following:** | |
| ca | kah | 7 | siete | 22 | veintidós | 1. Tengo tres hermanos y una hermana (y= and) | |
| cu | koo | 8 | ocho | 23 | veintitres | 2. I have five sisters and a brother. | |
| que | keh | 9 | nueve | 24 | veinticuatro | 3. I have seven siblings. | |
| qui | key | 10 | diez | 25 | veinticinco | **TASK 7: Explain the two possible translations for 'hermanos'** | |
| rr | rrr | 11 | once | 26 | veintiséis | 6: Personality and adjective agreement | |
| j | a bit like 'h' or at the back | **12** | doce | 27 | veintisiete | | |
| | of your throat 'jhuh' | 13 | trece | 28 | veintiocho | Spanish | English |
| Rules: most Spanish letters are phonetic. They sound | | 14 | catorce | 29 | veintinueve | soy | I am |
| how they are spelt. Remember the rules above to sound | | 15 | quince | 30 | treinta | eres | you are |
| like a native Spanish speaker! | | ¿Cuántos años tienes? | How many years do you have? | 31 | treinta y uno | es | he/she/it is |
| **TASK 1: Read the following words out loud in Spanish:** | | | | ¿Cuándo es tu | When is your | generoso/a | generous |
| equitación, cesped, cinco, cuatro, catorce, educación | | tengo tres años | I have three years | cumpleaños? | birthday? | simpático/a | nice |

| **2: Greetings** | | tienes | you have | Mi cumpleaños es el...de... | | listo/a | clever |
|---|---|---|---|---|---|---|---|
| | | tengo | I have | My birthday is the... | of... | tímido/a | shy |
| Spanish | English | Star structure: tengo ganas de cumplir ... años | | January | enero | tonto/a | silly |
| hola | hello | I'm looking forward to turning... years old | | February | febrero | divertido/a | fun |
| ¿Qué tal? | How are you? | In Spanish we do not say 'I am eleven years old'. | | March | marzo | tranquilo/a | calm |
| fenomenal | great | Instead we say 'I have eleven years.' | | April | abril | listo/a | clever |
| bien, gracias | good, thank you | It is important that you know the key verbs I have and | | May | mayo | serio/a | serious |
| regular | ok | you have. (tiene = he/she has) | | June | junio | sincero/a | sincere |
| fatal | terrible | **TASK 3: Translate:** | | July | julio | o at end of adjective | used to describe a female (f) |
| ¿Cómo te llamas? | What's your name? | 1. I have fourteen years | | August | agosto | a at end of adjective | used to describe a male (m) |
| Me llamo... | I call myself | 2. I have ten years. | | September | septiembre | Soy sincero **pero** no soy tonto | I am sincere **but** I am not silly (male talking) |
| ¿Y tu? | and you? | 3. You have twelve years. | | October | octubre | **TASK 8: translate:** | |
| hasta luego | see you later/soon | 4.Tengo ganas de cumplir quince años | | November | noviembre | 1. Soy divertida y lista. | |
| adios | goodbye | 5. **Practise** your phonics by reading all numbers out loud | | December | diciembre | 2. Es tonto y generoso. | |
| **TASK 2: Write a dialogue in Spanish** of two people meeting, then read out loud to practise your phonics. | | in your perfect Spanish accent. | | **TASK 4: practise** your phonics by reading out loud | | 3. Mi hermano es tranquilo. | |
| | | | | **TASK 5:translate the following:** | | 4. Eres simpática y timida. | |
| | | | | 1. Mi cumpleaños es el once de enero. | | 5. I am serious and nice but my brother is fun | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 2. My birthday is the sixteen of July. | | |
| | | | | 3.My birthday is the twenty nine of December. | | |

**TASK 9**: Bringing it all together. 1. **Read** the parallel texts out loud in both Spanish and English to practise your pronunciation.

***Hola, me llamo Juan. ¿Qué tal? Tengo diez años y mi cumpleaños es el catorce de mayo. Tengo ganas de cumplir doce años. Tengo una hermana pero no tengo hermano. Mi hermana tiene catorce años. Es divertida y seria. Soy simpático y tranquilo. ¿Y tu? Hasta luego.*** Hello, my name is Juan. How are you? I am ten years old and my birthday is the 14th of May.

I am looking forward to turning twelve years old. I have one sister but I don't have a brother. My sister is fourteen years old. She is fun and serious. I am nice and calm. And you? See you later.

**Find** the Spanish for: I don't have a brother, and you?, she is, she has, I have, I am called, I'm looking forward to

| **Using the text to help you, translate:** I am looking forward to turning fourteen years old. | | | | |
|---|---|---|---|---|

**TASK 10**: Using the text from task 9, **write** your own version of this text. It does not have to be factual, simply use what is on this knowledge organiser. Don't forget to use a star structure!

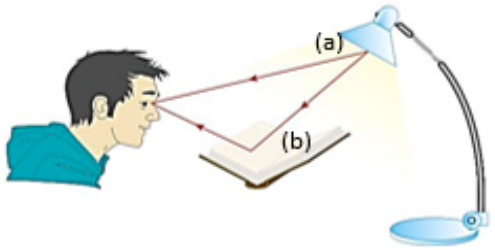


# MFL—Spanish

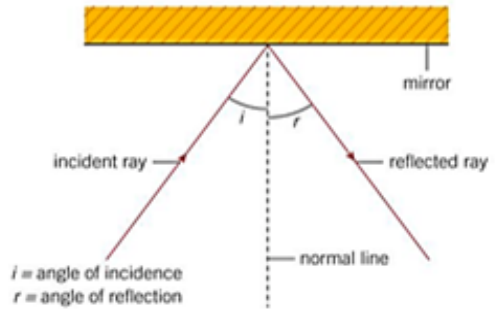
Community | Opportunity | *"Inspiring Education for All"* | Enjoyment | Success

# Knowledge Organiser – 4.2 Light

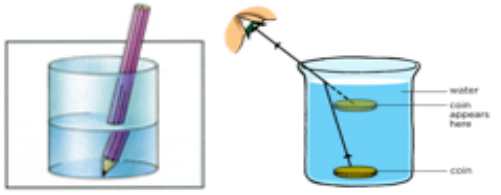
- Light travels in straight lines.
- Seeing luminous objects (a); light travels directly to the eyes.
- Seeing non-luminous objects (b); light reflects off the book and into your eye.




**THE LAW OF REFLECTION; light is reflected at equal angles.**

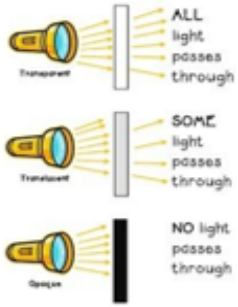



**REFRACTION** happens when light travels from one medium (material) to another. Refraction explains why the pencil appears to be bent in water or why the coin looks closer to the surface that it actually is.




Your eye detects three primary colours: red, blue and green. Mixing two primary colours makes a secondary colour.

**TRANSPARENT, TRANSLUCENT & OPAQUE**

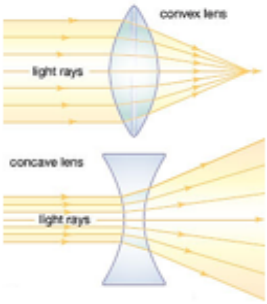



Light can travel through gas (air), some liquids (water) and some solids (glass). It can also travel through a vacuum. Light travels as a wave at a speed of ~ 300 million m/s.

**TYPES OF REFLECTION**


▲ Reflection from a smooth surface (specular reflection).

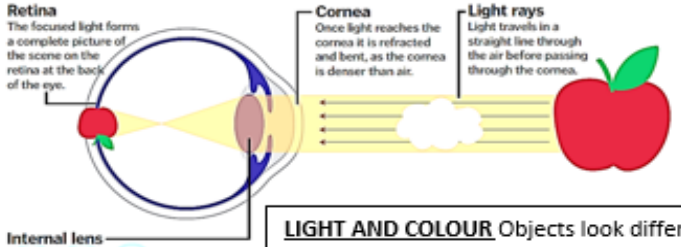
▲ Reflection from a rough surface (diffuse reflection), or scattering.

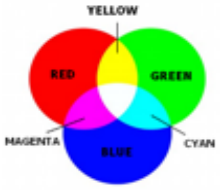



**CONVEX LENS:** found in cameras, telescopes, glasses and contact lenses. They produce real images (camera) and virtual images (magnifying glass).

**CONCAVE LENS:** found in door spyholes. Only produce virtual images.

**HOW DO WE SEE?** The image is inverted as light travels in straight lines. But the brain flips the image so you see the image the right way up.




**LIGHT AND COLOUR** Objects look different colours as they absorb and reflect different light into the eyes.


▲ Your eye and brain perceive no light as black and all the frequencies of light as white.

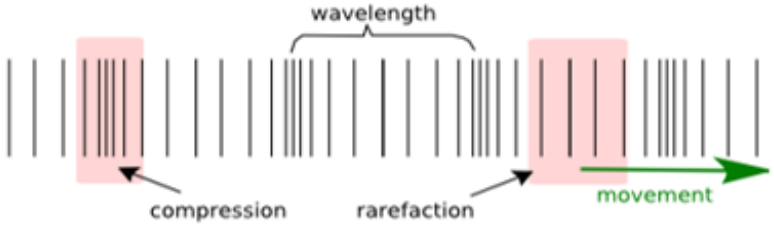

◀ An apple reflects red light and absorbs the other colours.

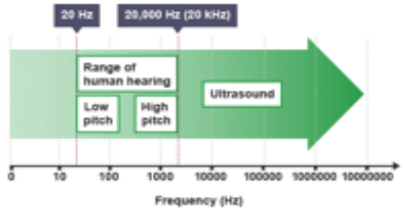
| KEYWORD | DEFINITION |
|---|---|
| Concave | A lens that is thinner in the middle and that spreads out light rays (diverging). |
| Convex | A lens that is thicker in the middle and that bends light rays towards each other (converging). |
| Diffuse reflection | Reflection from a rough surface. |
| Dispersion | The splitting up of a ray of light of mixed wavelengths by refraction into its components. |
| Eclipse | Appearance of the sun when light is blocked by the moon, or appearance of the moon when light is blocked by Earth. |
| Filter | A piece of material that allows some radiation (colours) through but absorbs the rest. |
| Image | The point from which rays if light entering the eye appear to have originated. |
| Incident ray | Incoming ray from a source of light. |
| Inverted | Upside down |
| Luminous | Object that gives out light. |
| Non-luminous | Objects that produce no light. |
| Photoreceptor | A specialised cell (in the eye) that is sensitive to light. |
| Prism | A triangular shaped piece of glass used to produce a spectrum of light. |
| Reflected ray | The outgoing ray that has been reflected from a surface. |
| Reflection | The change in the direction of light when it hits a boundary and bounces back. |
| Refraction | Change in the direction of light going from one material into another. |
| Spectrum | A band of colours produced when light is spread out by a prism. |
| Specular reflection | Reflection from a smooth surface. |
| Virtual (image) | An image that cannot be focused onto a screen, unlike a real image which can be put on a screen. |

# Knowledge organiser – 4.1 Sound

- Waves transfer energy from one place to another.
- Waves are made by forcing something to vibrate or oscillate.
- There are two types of waves; transverse and longitudinal.
- Sound waves are longitudinal waves. Light and waves on water are transverse waves.

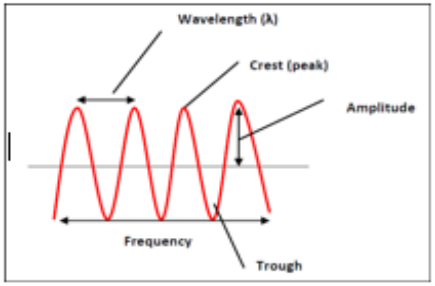
The frequency of sound waves is measured in hertz, Hz.
The bigger the number, the greater the frequency and the higher the pitch of the sound.
Human beings can generally hear sounds as low as 20 Hz and as high as 20,000 Hz (20 kHz).



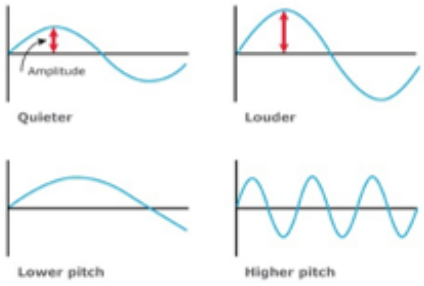




**Sound waves can only travel through a solid, liquid or gas.** They cannot travel through empty space.

Sound travels faster through liquids and solids than it does through air and other gases. This is because the particles of gases are further apart than liquids and finally solids. **Sound waves move more slowly when particles are further apart.**

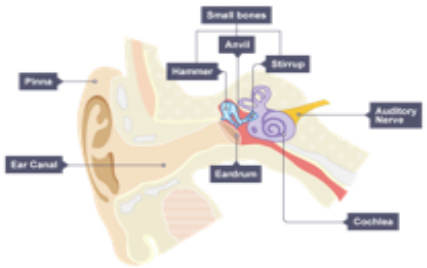



All waves have three important features; an **amplitude**, a **frequency** and a **wavelength**. The top of the wave is called a **peak/crest** and the bottom is called a **trough**.




| KEYWORD | DEFINITION |
|---|---|
| Absorption | When energy is transferred from sound (or other waves) to a material. |
| Amplitude | Maximum amount of vibrations, measured from the middle of the wave, in metres. |
| Auditory range | The lowest – highest frequencies that an animal can hear. |
| Decibel | Unit of sound intensity or loudness (dB) |
| Echo | Reflection of sound waves from a surface back to the listener. Hard, smooth surfaces are particularly good at reflecting sound. |
| Frequency | Number of waves produced in one second, in hertz (unit of frequency). |
| Infrared | Sound below a frequency of 20Hz |
| Longitudinal wave | Where the direction of vibrations is the same as the wave; sound waves are longitudinal. |
| Medium | Material that affects light or sound by slowing it down or transferring the wave. |
| Oscilloscope | Device able to view patterns of sound waves that have been turned to an electrical signal. |
| Ultrasound | Sound at a frequency greater than 20 000Hz, beyond the range of human hearing. |
| Vacuum | A space with no particles of matter in it. |
| Vibration | A back and forth motion that repeats. |
| Volume | How loud or quiet a sound is, in decibels. |
| Wavelength | Distance between two corresponding points on a wave, in metres. |

1. The vibrations in the air enter the pinna, travel down the ear canal and make the eardrum vibrate.
2. These vibrations are passed through the three small bones (called ossicles) to a spiral structure called the cochlea.
3. Signals are passed from the cochlea to the brain through the auditory nerve.
4. Our brain interprets these signals as sound.




| Comparing light and sound waves | |
|---|---|
| **Similarities** | **Differences** |
| Both transfer energy | Travel as different type of wave |
| Both have a range of frequencies and wavelengths | Sound waves need particles to carry energy but light waves do not |
| Travel in waves | Different speeds – light travels up to a million times faster (300 000 000 m/s) than sound |