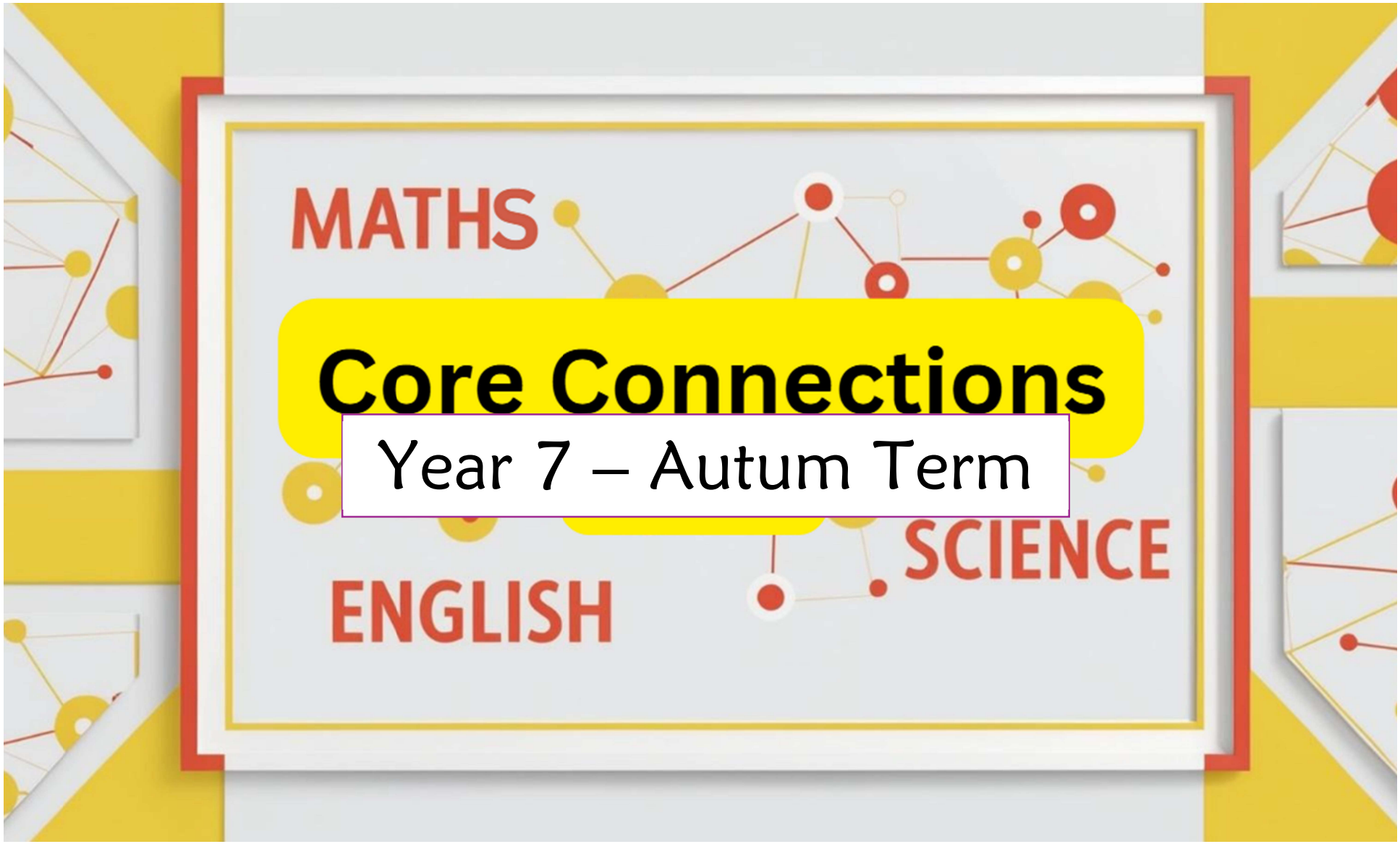

MATHS
Core Connections
Year 7 – Autum Term
SCIENCE
ENGLISH

# Core Connections @ Southam College

The following sheets provide a broad overview of the topic(s)s studied in Year 7 this Autumn Term.

They are not intended as additional work but as a resource to look up key concepts when going over lesson content before or after your lessons or when completing home learning.

There are also links to online resources if you would like further explanations or examples.

We hope you find them useful and will ask you at the end of the half-term for some feedback.

English

Maths

Science (Biology / Chemistry / Physics)

# English

**How do stories change the world?**

The first unit in year 7 will focus on a range of extracts from literature over time to establish how stories reflect and change the world. Some of the extracts include stories from:

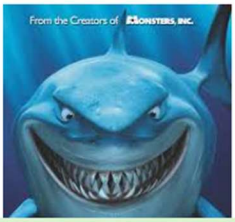
**The Odyssey**

The Odyssey tells the story of Odysseus's long journey home after the Trojan War, facing gods, monsters, and temptations that test his courage and intelligence. It explores themes of heroism, loyalty, and perseverance, showing how human strength and cunning can overcome divine challenges.

The Odyssey has shaped popular culture by providing one of the earliest and most influential adventure narratives. Its hero, monsters, and themes continue to inspire books, films, television shows, and video games.
One of the most important legacies of The Odyssey is its influence on the hero's journey narrative. Odysseus's long voyage home, filled with challenges, temptations, and personal growth, became a model for countless adventure stories.




After Bowser captures Peach, Mario teams up with Cappy, a sentient hat from the Cap Kingdom. Together, they pilot an airship called the Odyssey across multiple kingdoms to rescue Peach.




*Finding Nemo* follows an overprotective clownfish named Marlin who, after losing his wife, becomes intensely fearful of the ocean. When his son, Nemo, is scooped up by a scuba diver in the Great Barrier Reef, Marlin embarks on a desperate rescue mission, facing challenges along the way.




Joined by his partner Pokémon Pikachu, Ash goes on a quest to become a "Pokémon Master", traveling through the various regions of the Pokémon world and competing in various Pokémon-battling tournaments.



Moana is chosen by the ocean to return the mystical heart of the goddess Te Fiti. Te Fiti's heart was stolen by the demigod Maui, and Moana must find him to sail across the ocean and restore balance to her dying island.

**Everyman**

Everyman is a morality play where a man called Everyman must face Death and learn that only his good deeds can go with him to the afterlife. It teaches that material things and shallow friendships won't help you, but living a good, responsible life will.

**The Faerie Queen**

The Faerie Queene by Edmund Spenser is an epic allegorical poem celebrating virtue and moral strength, following knights who embody qualities like holiness and temperance. Through their quests, Spenser explores Elizabethan ideals of heroism and faith, blending myth, romance, and political symbolism.

**The Narrative of Olaudah Equiano**

Olaudah Equiano's narrative describes how he was taken from his home, enslaved, and forced to endure the horrific conditions of the Middle Passage. He later bought his freedom and used his story to show people how cruel slavery was and to fight for its abolition.

**Key terminology**

- **Hubris** refers to extreme, excessive pride, arrogance, or dangerous overconfidence. It is a personality trait that often blinds individuals to their own limitations or the consequences of their actions, frequently resulting in a spectacular downfall.
- **Morality play** is a very old theatrical form, going back to the medieval period, which sought to instruct audiences about virtue and evil. The primary goal was to guide audiences toward a righteous Christian life, warning them against worldly temptations and the inevitability of death. Morality plays are usually allegorical, meaning the characters and story often represent a hidden message or mirror a problem in society.
- **Personification** is a figure of speech in which human characteristics are attributed to an abstract quality, animal, or inanimate object.
- **Allegory** is when a story, character, or event stands for something deeper, like an idea or message about life, society, or morality. It's basically a story with a hidden meaning, where what happens on the surface represents something bigger underneath.
- **Semantic Field** is a group of words that are all linked to the same idea or topic, helping to create a clear mood or meaning in a text. For example, words like *dark, shadow, night,* and *gloom* all belong to a semantic field of darkness.

### 1.2 October October - Key Themes

**Character Breakdown**

👱 **October**
- **Role**: Protagonist and narrator
- **Personality**: Fiercely independent, imaginative, and deeply connected to nature. October is proud of her wild upbringing in the woods and resists change with intensity.
- **Development**: Over the course of the novel, she undergoes significant emotional growth. Initially distrustful and angry about being taken from her father and the woods, she gradually learns to adapt, open up, and find new ways to express herself.
- **Notable traits**: Possibly neurodivergent or shaped by her isolated upbringing—she experiences the world in a unique, sensory-rich way and often struggles with emotional regulation.

👱 **October's Dad**
- **Role**: October's primary caregiver and her closest companion
- **Personality**: Gentle, resourceful, and loving. He raises October in a self-sufficient lifestyle, teaching her to respect and live in harmony with nature.
- **Significance**: His accident is the catalyst for October's transition to city life. Despite being physically absent for much of the story, his influence remains strong throughout.

👱 **October's Mum**
- **Role**: Estranged mother who re-enters October's life after her father's accident
- **Personality**: Patient, persistent, and quietly loving. She tries to reconnect with October despite the girl's resistance.

- **Development**: Through small, consistent gestures, she begins to rebuild trust and show October that love can take many forms—even if it looks different from what she's used to.

🦉 **Stig (the Owl)**

- **Role**: A rescued baby owl October finds and cares for
- **Symbolism**: Represents October's connection to the wild and her nurturing side. Stig also mirrors her own journey—displaced, vulnerable, and learning to adapt to a new world.

# Maths

# Year 7 Maths: Core Connections

Listed in the left hand and middle columns in the tables below are the topics that you will be covering in the Autumn term in your Maths lessons.

To enable you to keep up while you are not in school there are links to SPARX tasks in the right hand column.

Use the independent learning section within SPARX to try the tasks and remember that if you struggle there are videos to guide you!

| | | | | |
|---|---|---|---|---|
| 7 – WK1/2 – Sequences | **Sequences** | Lessons 1/2 | • Describe and continue a sequence given diagrammatically<br>• Predict and check the next term of a sequence<br>• *Represent sequences in tabular and graphical forms | • M241 – Term-to-Term rules for sequences of patterns<br>• M381 – Term-to-Term rules for numerical sequences<br>• M618 – Coordinates |
| | | Lesson 3 | • Recognise the difference between linear and non-linear sequences | |
| | | Lesson 4 | • Continue numerical linear sequences | |
| | | Lesson 5 | • Continue numerical non-linear sequences | • M981 - Special sequences |
| | | Lesson 6 | • Explain the term to term rule of numerical sequences in words<br>• *Find missing numbers within sequences | |

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| 7 – WK3 -4 – Understand and use algebraic notation | **Understand and use algebraic notation** | Lesson 1 | • Given a numerical input, find the output of a single function machine.<br>• Use inverse operations to find the input given the output. | |
| | | Lesson 2 | • Use diagrams and letters to generalise number operations.<br>• Use diagrams and letters with a single function machine.<br>• *Find the function machine given a simple expression. | • M952 – Using the commutative laws<br>• M409 – Using the associative laws<br>• M813 – Algebraic Notation |
| | | Lesson 3 | • Substitute values into single operation expressions. | • M417 – Substituting into expressions with one operation |
| | | Lesson 4 | • Find numerical inputs and outputs for a series of two function machines.<br>• Use diagrams and letters with a series of two function machines.<br>• *Find the function machines given a two-step expression. | • M813 – Algebraic Notation |

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| | | Lesson 5 | • Substitute values into two-step expressions. | • M327 – Substituting into expressions with multiple operations |
| | | Lesson 6 | • Generate sequences given an algebraic rule.<br>• *Represent one- and two- step functions graphically. | • M991 – Position-to-term rules for arithmetic sequences |

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| 7 Autumn 1– WK5 -6<br>Equality and equivalence | **Equality and equivalence** | Lesson 1 | • Understand the meaning of equality<br>• Understand and use fact families, numerically and algebraically | |
| | | Lesson 2 | • Solve one step linear equations involving +/−using inverse operations | • M462 – Diving numbers into equal groups |
| | | Lesson 3 | • Solve one step linear equations involving ×/÷using inverse operations | • M707 – Solving equations with one step |

| | | | | |
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| | | Lesson 4 | • Understand the meaning of like and unlike terms | |
| | | Lesson 5 | • Understand the meaning of equivalence<br>• Simplify algebraic expressions by collecting like terms, using the ≡ symbol | • M795 – Simplifying expressions containing a single variable<br>• M531 – Simplifying expressions containing a multiple variables<br>• M949 – Simplifying expressions containing non-linear terms |

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| 7 – WK7 – 9 – Place value and ordering | **Place value and ordering** | Lesson 1 | • Recognise the place value of any number in an integer up to one billion<br>• Understand and write integers up to one billion in words and figures | • M704 – Understanding and ordering whole numbers |
| | | Lesson 2 | • Work out intervals on a number line<br>• Position integers on a number line | • M704 – Understanding and ordering whole numbers |
| | | Lesson 3 | • Round integers to the nearest power of ten | • M111 – Rounding whole numbers |
| | | Lesson 4 | • Compare two numbers using =, ≠≠, <, >, ≤≤,<br>• Order a list of integers | |
| | | Lesson 5 | • Find the range of a set of numbers | • U526 – Calculating the range |
| | | Lesson 6 | • Find the median of a set of numbers | • U526 – Calculating the median |
| | | Lesson 7 | • Understand place value for decimals<br>• Position decimals on a number line | • M522 – Understanding and ordering decimals<br>• M431 – Rounding decimal |
| | | Lesson 8 | • Compare and order any number up to one billion<br>• Round a number to 1 significant figure | • M994 – Rounding whole numbers using significant figures<br>• M131 – Rounding decimals using significant figures |
| | | Lesson 9 | • **Write 10, 100, 1000 etc. as powers of ten** | |

| | | | | |
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| 7 – WK10 – 12 – Fraction, decimal and percentage equivalence | **Fraction, decimal and percentage equivalence** | Lesson 1 | • Represent tenths and hundredths as diagrams<br>• Represent tenths and hundredths on number lines | • M522 – Understanding and ordering decimals |
| | | Lesson 2 | • Interchange between fractional and decimal number lines | |
| | | Lesson 3 | • Convert between fractions and decimals tenths and hundredths<br>• Convert between fractions and decimals fifths and quarters | • M263 - Converting between fractions, decimals and percentages |
| | | Lesson 4 | • Understand the meaning of percentage using a hundred square<br>• Convert fluently between simple fractions, decimals and percentages | • M263 - Converting between fractions, decimals and percentages |
| | | Lesson 5 | • Use and interpret pie charts | • M574 – Drawing Pie Charts<br>• M165 – Interpreting Pie Charts |
| | | Lesson 6 | • Represent any fraction as a diagram<br>• Represent fractions on number lines | • M158 Finding fractions of shapes |
| | | Lesson 7 | • Identify and use simple equivalent fractions<br>• Understand fractions as division | |
| | | Lesson 8 | • Convert fluently between fractions, decimals and percentages | • M263 - Converting between fractions, decimals and percentages |

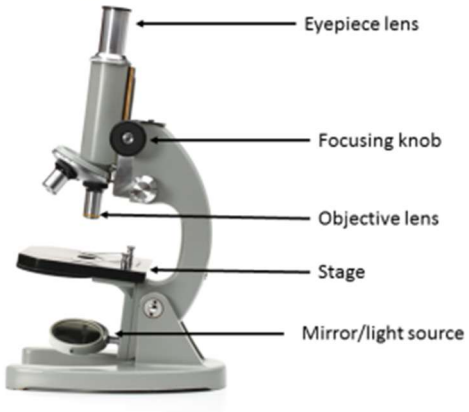
# Science

**Year 7 Biology Core Connections Autumn Term**

# 7B1 Cells

## Lesson 1: Microscopes

- All living organisms are made up of cells.
- Cells are the smallest part of a living organism and are around 0.01 mm - 0.03 mm long.
- To look at a cell close up a microscope needs to be used.

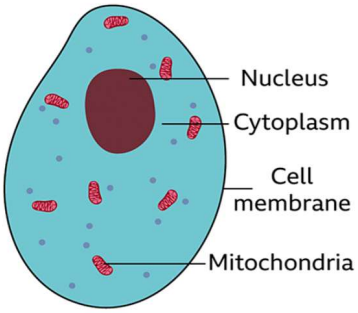



## Lesson 2: Plant and Animal Cells

- Cells are the smallest unit of life and the building blocks for all organisms.
- Each component of a cell has its own function.
- Animal and plant cells differ and they have similarities.
- Nucleus, cell membrane, cytoplasm and mitochondria are four cell components that are found in both animal and plant cells.

## What makes up an animal cell?

Each component in the animal cell has a particular function. Animal cells often have an irregular shape.

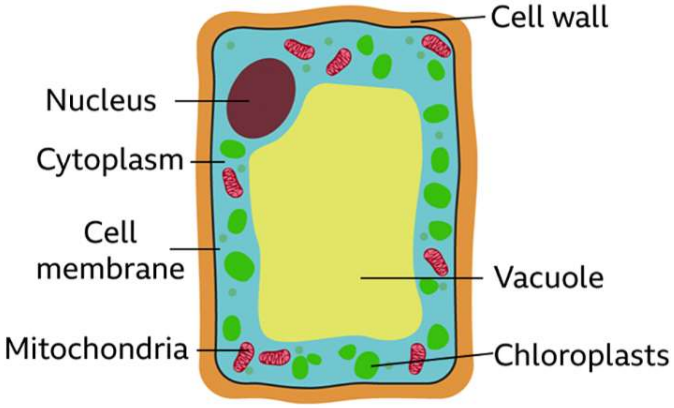



## What makes up a plant cell?

Plant cells often have a regular shape. They have the same cell components as animal cells: a **nucleus, cell membrane, cytoplasm** and **mitochondria.**

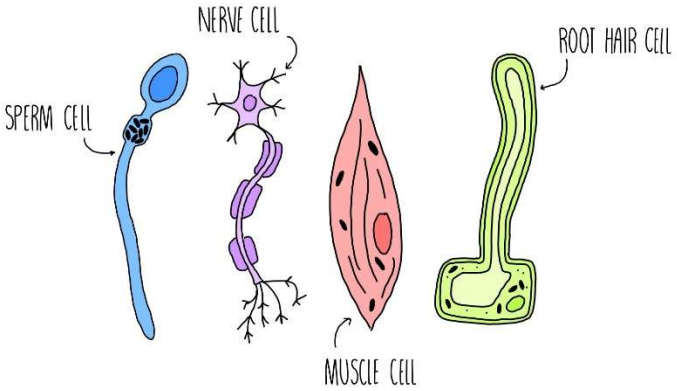
They also have these extra three as well:

- **Cell wall:** a tough outer layer of the cell, which contains cellulose to provide strength and support to the plant.
- **Vacuole:** a space inside the cytoplasm that contains a watery liquid called cell sap. It keeps the cell firm.
- **Chloroplasts:** structures found in the cells of green parts of plants only (leaves and stems) which contain a green pigment called chlorophyll in which photosynthesis occurs.



**Lesson 3: Specialised Animal and Plant Cells**

- Specialised animal cells have components that allow them to complete a specific purpose.
- Specialised animal cells include red blood cells, sperm, eggs, nerve cells, muscle cells, ciliated cells, and villi.
- Specialised plant cells have components that allow them to complete a specific purpose.
- Specialised plant cells include root hair cells, palisade cells, xylem cells and phloem cells.



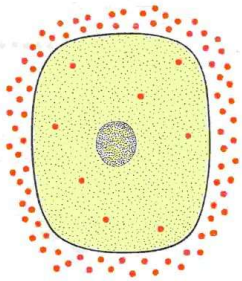
**Lesson 4: Movement of Substances**

- Diffusion is the movement of particles from higher to lower concentrations.
- Diffusion happens naturally and so does not require energy.
- Substances like oxygen, carbon dioxide and glucose move in and out of cells by diffusion.
- The diffusion of water from an area of higher to lower concentration across a *membrane* is called osmosis. The expression 'across a membrane' often means in or out of a cell, which is surrounded by a membrane.

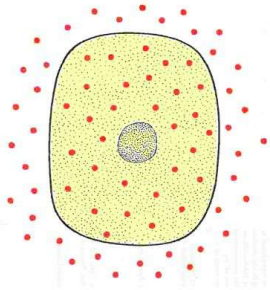


Diffusion of oxygen into a cell

The concentration of oxygen molecules is greater outside the cell than inside

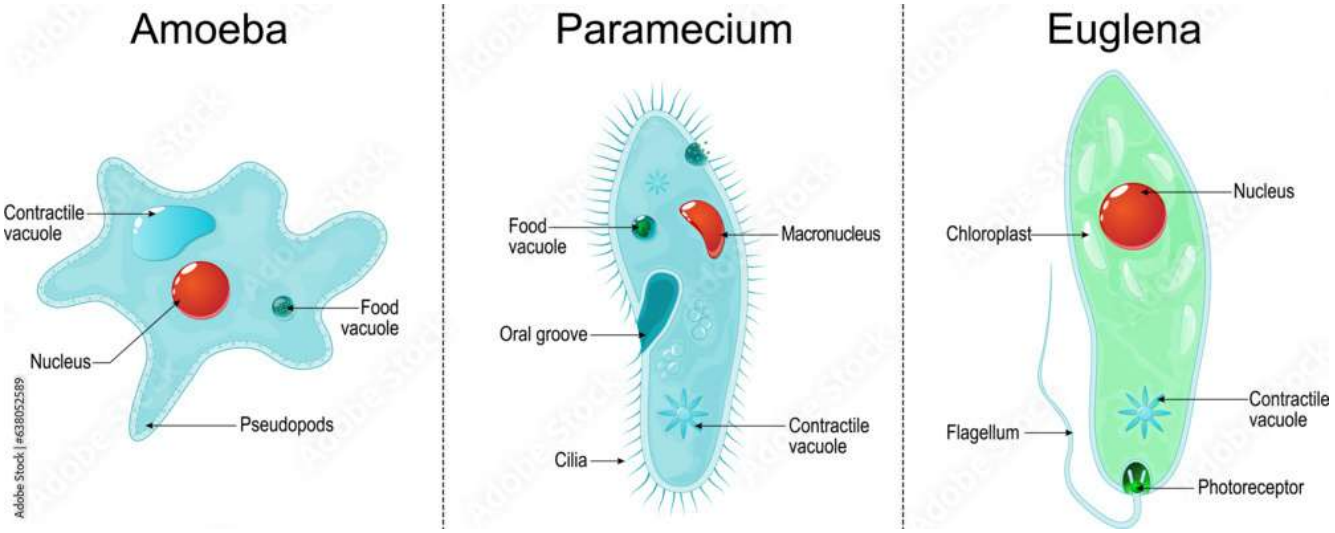


So the oxygen molecules diffuse into the cell



**Lesson 5: Unicellular Organisms**

Some liing organisms are made of only one cell. Examples are amoeba, paramecium and euglena. Bacteria are alon only made of one cell.



**Lesson 6: Microscopy Practical Work**

Use the online virtual microscope to look at some images.

**Chemistry Core Connections**

# Year 7: C1 – Particles and their Behaviour

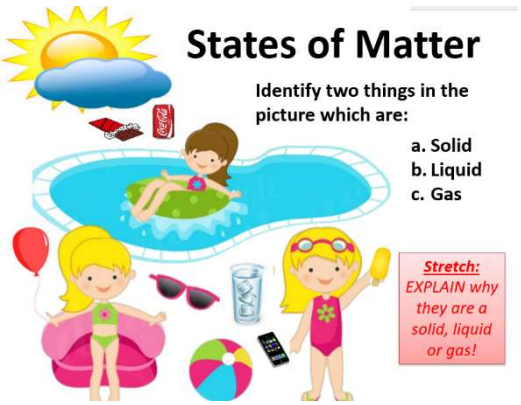
## Lesson 1: Health and safety in science

- **Lab rules:** Always wear goggles, tie back long hair, and never eat or drink in the lab.
- **Hazard symbols:** Learn the meanings of symbols like corrosive, flammable, toxic, and irritant.
- **Risk assessment:** Understand how to identify hazards and reduce risks in experiments.

| Hazard symbol | Meaning | Typical hazard |
|---|---|---|
|  | Moderate health hazard | Causes skin irritation |
|  | Serious health hazard | Causes breathing difficulties |
|  | Toxic | Could cause death if swallowed or inhaled |
|  | Corrosive | Damages skin and clothing |
|  | Flammable | Catches fire easily |
|  | Oxidising | Makes flammable substances burn more fiercely |
|  | Harmful to the environment | Could cause damage to animal and plant life |

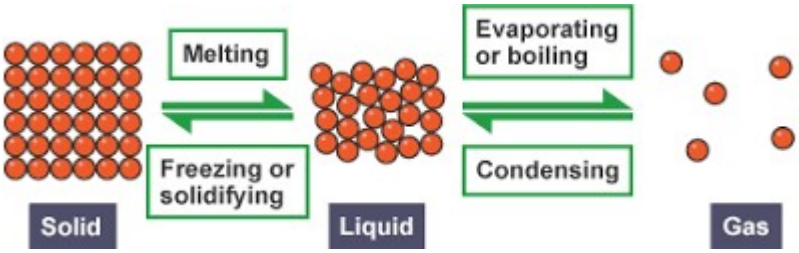
## Lesson 2: The particle model

- **Particles**: All matter is made of tiny particles.
- **Arrangement**: Solids (fixed), liquids (close but move), gases (far apart and fast).
- **Model limitations**: Diagrams are simplified and don't show forces or particle size.



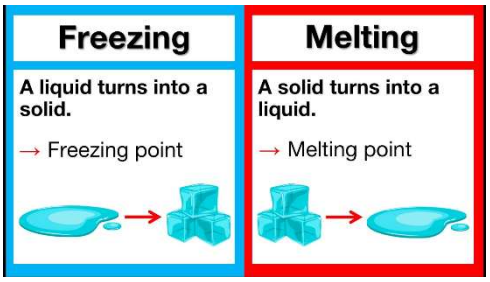

## Lesson 3: The three states of matter

- **Three states**: Solid, liquid, gas.
- **Changes of state**: Melting, freezing, boiling, condensation.
- **Energy and movement**: More energy = faster particles = change of state.



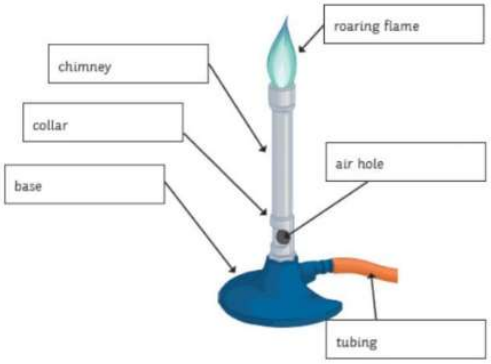
## Lesson 4: Melting and freezing

- **Melting point**: Temperature where a solid becomes a liquid.
- **Freezing point**: Temperature where a liquid becomes a solid.
- **Energy transfer**: Heat energy breaks or forms bonds between particles.



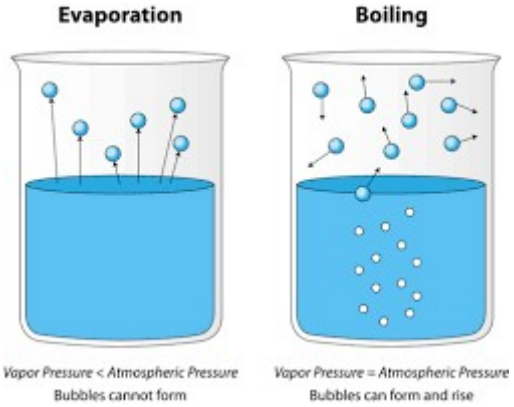

## Lesson 5: Using Bunsen burners safely

- **Parts**: Base, barrel, collar, air hole, gas inlet.
- **Flames**: Yellow (safety flame), blue (heating flame).
- **Lighting**: Check air hole is closed, light with a splint, then adjust.



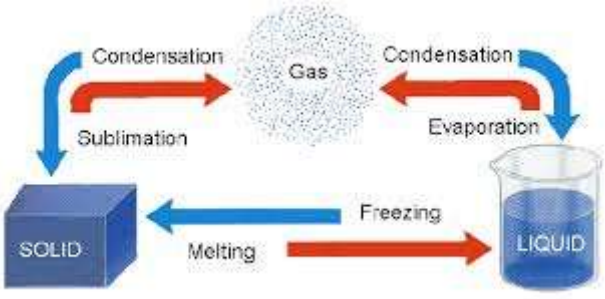

## Lesson 6: Boiling

- **Boiling point:** Temperature where a liquid becomes a gas throughout the liquid.
- **Bubbles:** Formed by gas escaping the liquid.
- **Difference from evaporation:** Boiling is faster and happens throughout the liquid.




## Lesson 7: Evaporation, sublimation and condensation.

- **Evaporation**: Liquid to gas at the surface, below boiling point.
- **Condensation**: Gas to liquid.
- **Sublimation**: Solid to gas (e.g., dry ice) without becoming liquid.



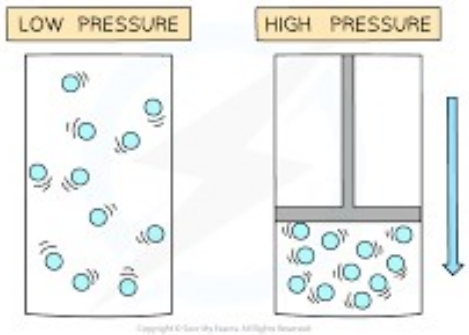

## Lesson 8: Diffusion

- **Definition**: Movement of particles from high to low concentration.
- **In gases and liquids**: Faster in gases due to more space between particles.
- **Examples:** Smell of perfume spreading, bromine gas in a jar.



**Lesson 9: Gas pressure**

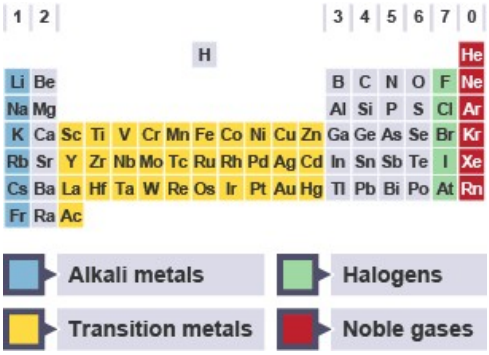
- **Caused by**: Particles hitting the walls of a container.
- **Increased by**: More particles, higher temperature, smaller volume.
- **Real-life examples**: Balloons, car tyres, aerosol cans.



# Year 7: C2 – Elements, atoms and Compounds

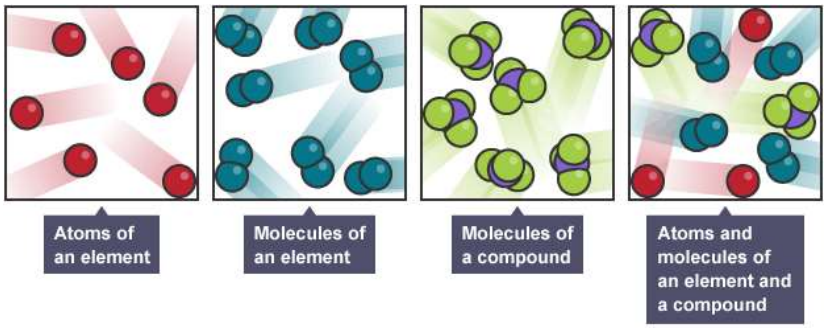
## Lesson 1: Elements

- An **element** is a substance made of only one type of atom.
- There are over 100 elements, listed in the **Periodic Table**.
- Each element has a **chemical symbol** (e.g., H for hydrogen, O for oxygen).
- Elements can be **metals** or **non-metals**.
- **Metals** are usually shiny, good conductors, and malleable.
- **Non-metals** are often dull, poor conductors, and brittle.



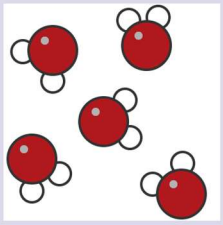

## Lesson 2: Atoms

- An **atom** is the smallest particle of an element that still has the properties of that element.
- Atoms are made of three subatomic particles:
  - **Protons** (positive charge)
  - **Neutrons** (no charge)
  - **Electrons** (negative charge)
- The **nucleus** contains protons and neutrons; electrons orbit the nucleus.
- The number of **protons** determines the element.



## Lesson 3: Compounds

- A **compound** is a substance made from two or more different elements **chemically joined**.
- Compounds have different properties from the elements they are made from.
- Compounds are formed through **chemical reactions**.
- They can be broken down into elements only by chemical means.

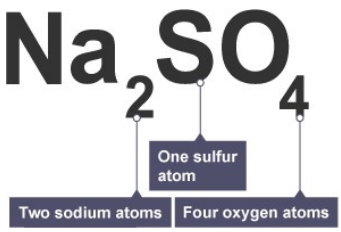
| | | |
|---|---|---|
| Compound | A substance made up of two or more **different** elements, chemically joined together |  |

## Lesson 4: Chemical Formula

- A **chemical formula** shows the elements in a compound and the number of atoms of each.
- **Subscripts** (small numbers) show how many atoms of each element are present.
- No subscript means only one atom.

**Examples:**

- $H_2O$: 2 hydrogen atoms, 1 oxygen atom.
- $CO_2$: 1 carbon atom, 2 oxygen atoms.
- NaCl: 1 sodium atom, 1 chlorine atom.



# Year 7: C3 – Chemical reactions

## Lesson 1: Chemical reactions

- **All** chemical reactions involve **atoms being rearranged into a new substance.** Like breaking down a lego house and making something new out of the same blocks.




- Chemical reactions can be identified by 1 or more of these changes:
  - **Flames or sparks**
  - **Colour change**
  - **Bubbles or fizzing.**
  - **Foul or sweet smells**
  - **Temperature changes.**
- Chemical reactions are **useful because you can make lots of useful substances** by carrying out chemical reactions.

## Lesson 2: Exothermic and endothermic reactions

- All chemical reactions are either **exothermic (they give out heat and make the temperature increase)** OR **endothermic (they take in heat and make the temperature decrease).**
- Examples of these reactions are, **exothermic – burning wood, fireworks, neutralising an acid.** OR **endothermic – sports injury pack.**

## Lesson 3: Thermal decomposition

- Thermal decomposition reactions is a specific type of chemical reaction.
- **Thermal – refers to heat.**
- **Decomposition – breaking down.**
- Therefore, this is a type of reaction where **heat is used to break down a substance.**

## Lesson 4: Burning fuels

- **Combustion** or **burning** is an **exothermic reaction.**
- **Combustion** involves reacting a **fuel with oxygen.**
- **This reaction releases lots of heat energy.**
- The products of combustion are **carbon dioxide and water.**

## Lesson 5: Conservation of mass

- The law of conservation of mass states that: **The mass of the reactants is equal to the mass of the products.**
- This means that if you have **10g of reactants** you must necessarily end up with **10g of products**.
- If **a gas is part of the reactants** then it will seem like the **mass has increased.**
- If **a gas is part of the products** it will seem like the **mass has decreased.**

# Year 7: C4 – Acids and alkalis

## Lesson 1: Acids and alkalis

- Acids and alkalis can be very dangerous. **In certain circumstances they can be corrosive.**
- Always wear eye protection when handling them.
- **Concentration:** This refers to how much of the acid/alkali is in a specific volume.
- A **concentrated acid/alkali** has **lots of acid/alkali particles.**
- A **dilute acid/alkali** has **fewer acid/alkali particles.**

## Lesson 2: Indicators and pH

- An indicator is a substance that **changes colour when mixed with an acid/alkali.**
- Universal indicator will turn **red in acids (pH1) green in neutral (pH7) and purple in alkalis (pH14).**
- Universal indicator can be used to determine whether an unknown liquid is an acid, alkali or neither.

**Lesson 3: Neutralisation**

- Neutralisation reactions are where an **acid/alkali is neutralised (made to be neither acid nor alkali).**
- A **base** is a substance that **can neutralise an acid.**

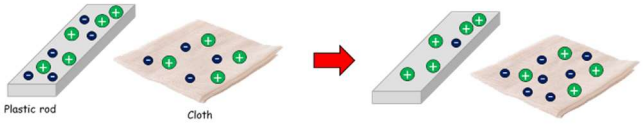
**Lesson 4: Making salts**

- A salt is a compound which is made when an **acid reacts with a metal or a base.**
- There are several chemical reactions which produce salts.
- **Acid + metal → salt + hydrogen**
- **Acid + base → salt + water**
- **Acid + alkali → salt + water.**
- Making salt crystals can be done by using a process called **crystalisation.**

# Physics Core Connections Year 7 Autumn Term

## Electricity and Magnetism

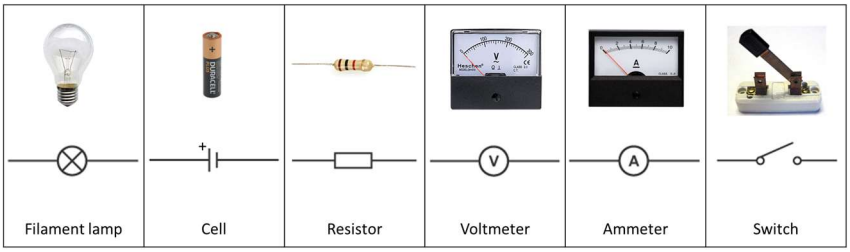
### Lesson 1 Static Electricity




- The particles in the rod and the cloth are **charged**.
- This means they are positive or negative.
- When you rub the rod with the cloth some of the particles are transferred.
- Now the rod has more positive charges and the cloth has more negative charges. They are opposites of each other and opposites attract.

### Lesson 2 Circuits and Current

- A circuit provides a route that the electric **current** can travel through, providing energy to **components**. A circuit is a complete loop of conductors
- **Current** is a measure of the amount of charge flowing per second. It is measured in **amps (A)**. We use **ammeters** to measure the current.
- We use symbols when drawing circuit diagrams:




### Lesson 3 & 4 Potential Difference



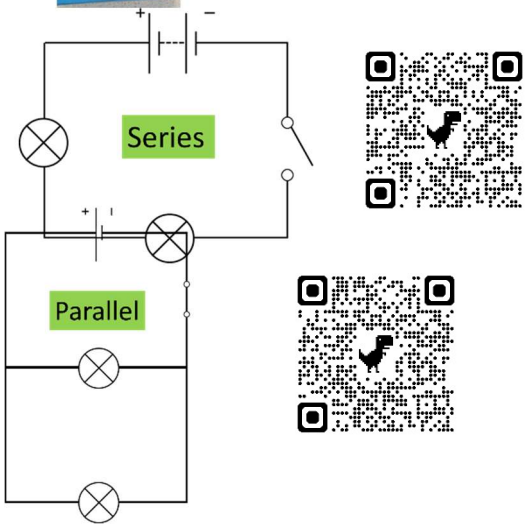
- **Potential difference** (voltage) is the **energy per charge**.
- Measured in **volts (V)** using a **voltmeter**.
- A higher voltage = more energy to push the current.

### Lesson 5 Series Circuits

- Components are connected one after another.
- **Current** is the same everywhere.
- **Potential difference** is shared between components.
- If one component breaks, the whole circuit stops working.

### Lesson 6 Parallel Circuits

- Components are connected on **separate branches.**
- Voltage is the **same** across each branch.
- Current is **shared** between branches.
- If one component breaks, **others still work.**



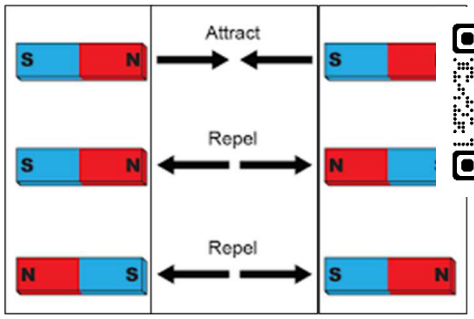
## Lesson 7 Resistance

- Resistance **slows down** the flow of current.
- Measured in **ohms (Ω)**.
- More resistance = **less current**.
- Long or thin wires and certain materials increase resistance.

$$Resistance\ (\Omega) = \frac{potential\ difference\ (V)}{current\ (A)}$$

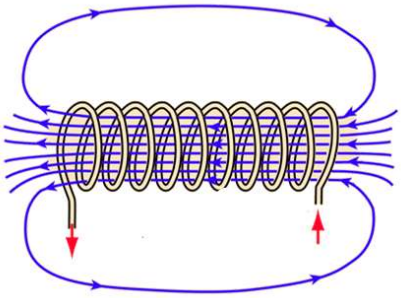
## Lesson 8 Magnets and Magnetic Fields

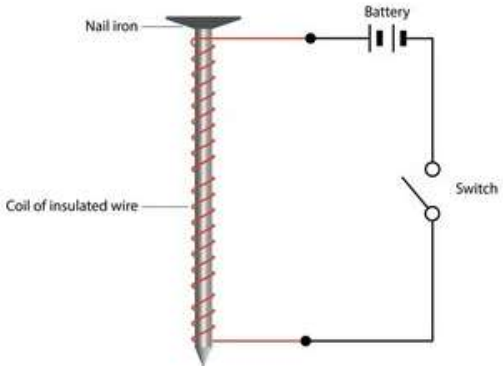
- Magnets have **North and South poles**.
- **Like poles repel, opposite poles attract**.
- Magnetic field: the area around a magnet where magnetic forces act.
- Field lines go from **North to South**.




## Lesson 9 Electromagnets

- A **coil of wire** with current flowing through it becomes a magnet. This is called a solenoid.
- Adding an **iron core** (like a nail) makes it stronger.






## Lesson 10 Using Electromagnets

- Electromagnets can be **turned on and off**.
- Strength depends on:
  - Number of coils
  - Current strength
  - Presence of an iron core
- Used in **scrapyards**, **doorbells**, and **MRI machines**.

**Want to go a little deeper?**

Use the QR codes above to find out more about each lesson.

**Year 7 Science Core Connections Autumn Term**

# Skills

## Lesson 1: Variables

- A variable is a factor that can be changed in an experiment.
- Identifying control variables, independent and dependent variables is important in making experiments fair.
- Knowing about variables can help you make scientific predictions and test them.

## Lesson 2: Planning

- Developing a method is an important part of planning an investigation.
- In an experiment, evaluate the validity of the steps leading up to the conclusion for it to be valid.
- Random and systematic errors can contribute to the uncertainty of a measurement.

## Lesson 3: Tables

Putting information into a table can make it easier to read and understand.
Draw the table before starting the experiment and include the following information:

- A heading in each column - include units if appropriate.
- The *independent variable* in the first column.
- The *dependent variable* in the other column.

## Lesson 4: Graphs

Putting information into a graph can make it easier to read and understand.

- The *independent variable* on the x-axis.
- The *dependent variable* on the y-axis.

Different types of graphs and charts are needed to present results from experiments.

Graphs and charts need to be drawn and labelled correctly.

Use patterns in the data to reach a conclusion in an experiment.