

# Year 8 Particle Theory

## Vocabulary

**State of matter** - Solid, liquid, gas,

**Flow** – Move in a steady stream

**Viscous** – How thick a substance is

**Particles** – the smallest piece of matter

**Energy** - ability to do work

**Vibrate** – move backwards and forwards

**Evaporate** – heat from a liquid to gas

**Condense** – cool from a gas to liquid

**Pressure** – compression force in a given area.

## Sticky knowledge

Particle theory helps us think about how matter behaves. It also helps us explain why different matter has different properties.

### 1. Solids, liquids and gases

Solid	Liquid	Gas
✓ Definite shape	✗ Definite shape	✗ Definite shape
✓ Definite volume	✓ Definite volume	✗ Definite volume
✓ Definite mass	✓ Definite mass	✓ Definite mass
✓ Close particles	✓ Close particles	✓ Particles far apart
✓ ↓ kinetic energy	✓ ↑ Kinetic energy	✓ ↑ Kinetic energy

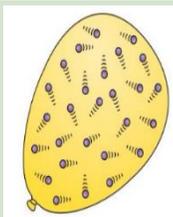


### 2. Particle arrangement



Particles in solid are packed tightly and vibrate.  
Particles in a liquid move but still touch each other.  
Particles in a gas move freely and spread out without touching.

### 3. Pressure



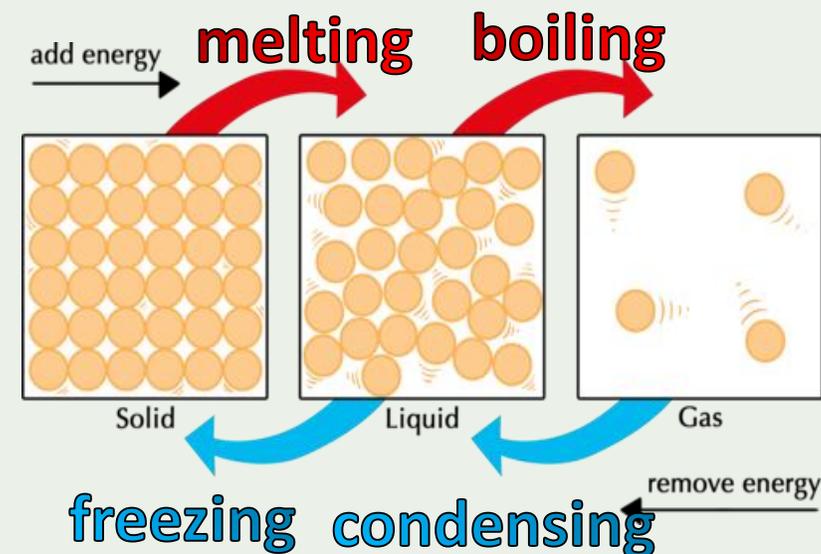
Gas particles hit the side of the container and cause pressure. Increasing gas particles and heating the gas particles increases the pressure.

### 4. Viscosity



That the viscosity of liquids affects how quickly they pour. The particles in a more viscous liquid do not move as freely.

### 5. Changes of state



Melting, boiling, evaporating, condensing, freezing are all changes of state caused by heating and cooling. Different solid materials melt at different temperatures.

# Year 8 Separating Mixtures

## Vocabulary

**Mixture** –two or more things that can be separated.

**Separate** converts a mixture or solution into two or more parts.

**Filter** –used to separate an insoluble solid from a pure liquid or a solution.

**Pure** -Not mixed with any other substance or material.

**Soluble** -A material that can be dissolved in liquid.

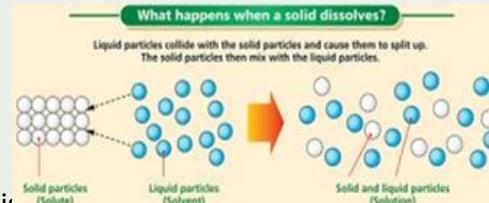
**Insoluble** -A material that does not dissolve in liquid.

**Chromatography** -Chromatography is a separation technique used to separate mixtures of soluble substances.

## Sticky knowledge

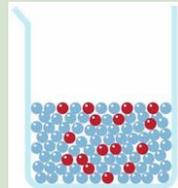
The substances in a mixture are relatively easy to separate, because they are not chemically joined to each other. We will use filtration, evaporation and chromatography to separate mixtures.

### 1. Identify and describe what a mixture is.



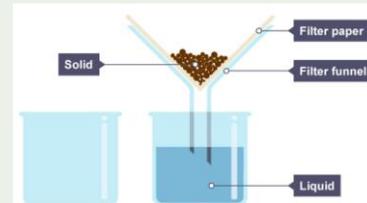
A mixture is a combination of two or more substances that can be separated in a variety of ways.

### 2. Recognise that some solids dissolve to make a solution.



That a solute (soluble solids) dissolve in a solvent (liquid) to make a solution (mixture)

### 3. Demonstrate and describe how filtration can separate a mixture.



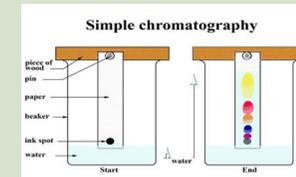
That filtration can be used to separate an insoluble solid (filtrate) from a liquid

### 4. Evaporation.



That evaporation is the change of state from a liquid to a gas through heating.

### 5. Describe how chromatography separates a mixture.



Many dyes and pigments are made out of a mixture of colours. If the mixtures are soluble (dissolve) they can be separated out using a solvent (liquid) and filter paper.

# Year 8 Forces

## Vocabulary

# Sticky knowledge

A force is something that can change the speed, direction and shape of an object and can be measured with a force meter.

**Contact and Non-contact-** *Touching and not touching.*

**Friction** -*One surface moving over another.*

**Balanced and unbalanced-** *Equal and not equal*

**Upthrust-** *Forces that pushes objects up*

**Newton's-** *The standard unit of force*

**Resistance** *A force that opposes or slows down another force*

**Static electricity** *A non-contact forces between charged objects.*

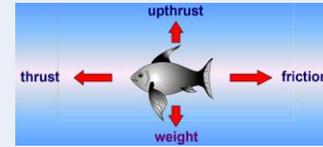
**Force Diagram** *A diagram showing the forces acting on the object*

### 1. Contact and non-contact forces.



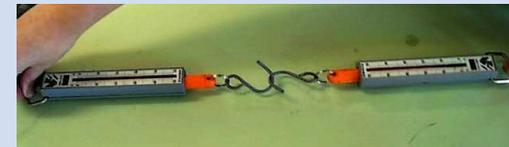
Forces can be **contact** (touching) such as friction, air resistance, up thrust or **non-contact** such as gravity and magnetism.

### 2. Force Diagrams



Forces are drawn through arrows to show the **direction and size of force** acting upon an object.

### 3. Measuring Forces



The measure of force is **Newton's (N)** and is measured using a **Newton meter**.

### 4. Balanced and unbalanced Forces.



If forces are **balanced**, nothing happens to the objects. If forces are **unbalanced**, the object can **speed up, slow down, change direction or change shape**.

### 5. Friction



**Friction (resistance)** is a **contact force** between two surfaces that act in **opposite directions to slow an object down**.

### 6. Air resistance.



**Air resistance slows down** a moving object by acting in the **opposite direction**.

# Year 8 Earths Resources Vocabulary

**Plastic** - Manmade material that can be made into different shapes.

**Metal**- Strong, hard and shiny materials that can be made into shapes.

**Natural**- Something that comes from nature

**Manmade**- Made by people rather than nature

**Crude oil**- A liquid found deep underground made from dead animals.

**Resource** -A source of supply

**Recycle**- making rubbish into something new

**Reuse**- Using items more than once

**Ore**- Metal containing rock.

**Finite**- It will end

**Non-renewable/Renewable** - Run out/not run out

**Decompose** - Break down

## Sticky knowledge

Earth's natural resources include air, water, soil, minerals, fuels, plants, and animals.

### 1. Materials



**Resources** such as metal, glass, wood, fabric and plastic **come from the earth**. These are very useful materials for different purposes

### 2. Plastic



Plastics are made from natural resource 'crude oil'. The crude oil undergoes many processes to turn it into plastic.

### 3. Metal



Metals come from metal ores that are mined from the earth. They undergo processes to extract the pure metal form.

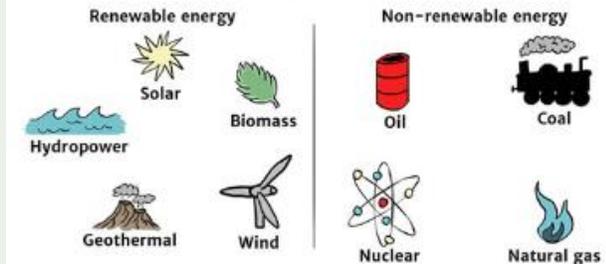
### 4. Recycling



Items we use are made by disrupting the environment and using energy. **Some resources** are **finite** and will run out. Some resources can take 1000+ years to **decompose**.

### 5.

#### Renewable and Non-Renewable Energy Sources



Non-renewable take millions of years to form and so are 'finite'. Renewable energies such as solar, wind, geothermal and tidal will not run out.

# Year 8 Waves - Light and Sound

## Vocabulary

**Waves** - one of the ways in which energy may be transferred.

**Vibrations** - particles that go back and forth

**Particles** - an extremely tiny piece of matter.

**Energy** - "the ability to do work".

**Vacuum** - a space with nothing in it, not even air

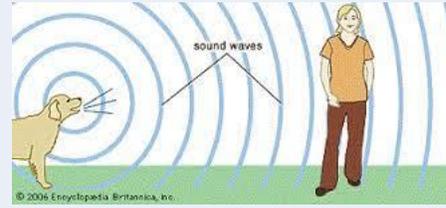
**Refraction** – Rays of light change speed and direction.

**Reflection** – Rays of light bounce off an object.

**Angle** – Measurement of where lines meet

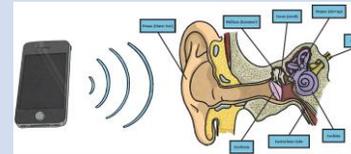
**Sticky knowledge** - Light is a form of energy that enables us to see the world around us. Light comes from different sources. Our main source of natural light is the sun. Sound is created when the vibration of an object causes waves of sound to reach our ears.

### 1. Describe how sounds travels.



Sounds travel through vibrations in waves.

### 2. Find out how humans hear.



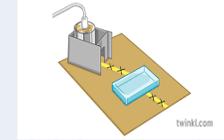
The sound wave vibrations travel through the canal and vibrates the eardrum. The vibrations are passed to three small ear bones. The bones push on the cochlea, which turning the vibrations into electrical signals and send to the brain via the auditory nerve.

### 3. Investigate reflection.



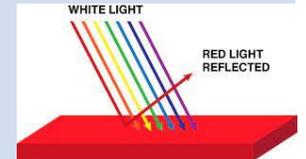
When light reaches a mirror, it reflects off the surface of the mirror: The incident ray is the light going towards the mirror The reflected ray is the light coming away from the mirror.

### 4. Investigate refraction.



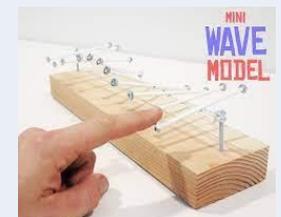
Light waves change speed when they pass across the boundary between solid, liquid and gas. This causes them to change direction and alter the appearance of an object.

### 5. Find out why we see colour.



White light contains all colours of the rainbow. When white light enters a water droplet or glass prism and then leaves it again, each different wavelength of light refracts at a slightly different angle.

### 6. Create a wave model.



REVIEW LESSON

# Year 8 Periodic table Vocabulary

**Elements** - An element is a substance that is made up of only one kind of atom e.g. oxygen, gold, copper.

**Periodic table** – organisation of the known elements.

**Properties** – How to describe something.

**Atom** - The smallest part of a substance that cannot be broken down

**Melting point** – temperature at which it changes from a solid to a liquid.

**Boiling point**- point at which it changes from a liquid into a solid.

**Density** – How heavy an object is for its size.

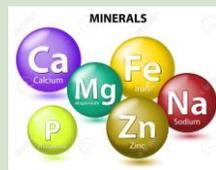
**Reactive** – how easy it creates a chemical reaction.

## Sticky knowledge

The periodic table of chemical elements, often called the periodic table, organizes all discovered chemical elements

### 1. Name different elements

An element is a substance that cannot be broken down into any other substance. Everything in the universe contains the atoms of at least one or more element They are represented by letter symbols.



### 2. The layout of the periodic table.

The periodic table lists all the known elements and groups together those with similar properties.

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

Legend: Metals (red square), Non-metals (yellow square)

### 3. Group 1 elements have similar properties.



These metals are soft (they can be cut with a knife) have relatively low melting points and have low densities

### 4. Group 7 have similar properties



Non-metals that have low boiling and melting points, very reactive.

# Year Evolution and inheritance.

## Vocabulary

**Variation** – range of differences

**Species** – types of living things e.g. Siberian tiger

**Continuous** – a massive range of variations e.g. shoe size

**Discontinuous** - a smaller range of variation e.g. eye colour

**Adaptation** – things to help living things survive.

**Natural selection** –nature selects the best traits for survival.

**Evolution** – How living things change and seem to transform over time

# Sticky Knowledge

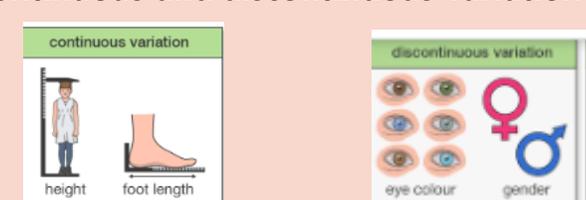
characteristics that help survival become gradually changes a species. In time, these small can evolve into a new species.

### 1. Variation within a species



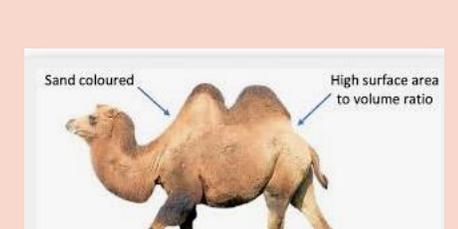
Variation, in biology, is any difference between cells, individual organisms, or groups of organisms of any species caused either by genetic differences or by the effect of environmental factors.

### 2. Continuous and discontinuous variation

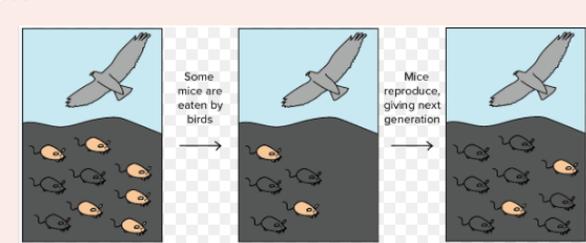


Continuous such as height (lots of different heights) or discontinuous such as eye colour (only a few different colours)

### 3. Adaptation

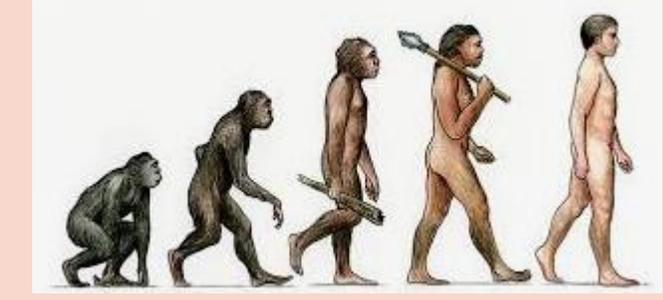


### 4. Natural selection



Living things better adapted to their environment tend to survive and produce more offspring

### 5. Evolution



Over time, these inherited characteristics become more dominant within the population. Over a very long period of time, these characteristics may be so different to how they were originally that a new species is created. This is evolution.



Genetic information is transmitted from both parents to the child.

## Vocabulary

**Genes** - Genes carry the information that determines your traits.

**Inherit** – What you get from your parents.

**Environmental** – Things around you.

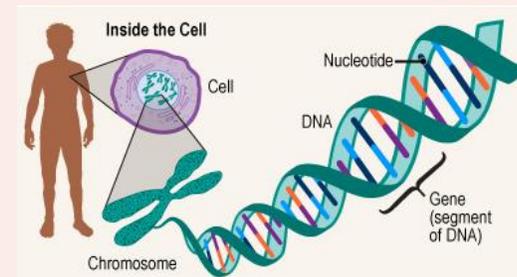
**Characteristics** – Things that make you you.

**DNA** - instructions to make people who they are

**Cell** – building blocks of living things.

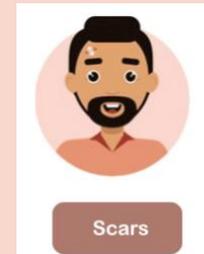
**Nucleus** – What controls the cell and contains the DNA.

## 1. Genes are what we inherit from our parents.



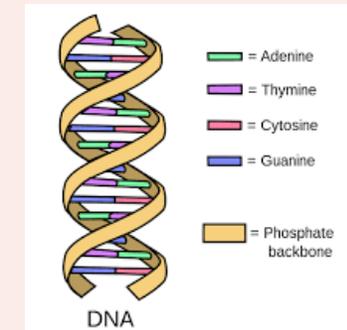
Genes are transferred from parents to offspring during reproduction. Sperm and egg cells carry half the total number of chromosomes (DNA) of each parent, Combine during fertilisation.

## 2. Inherited and environmental characteristics.



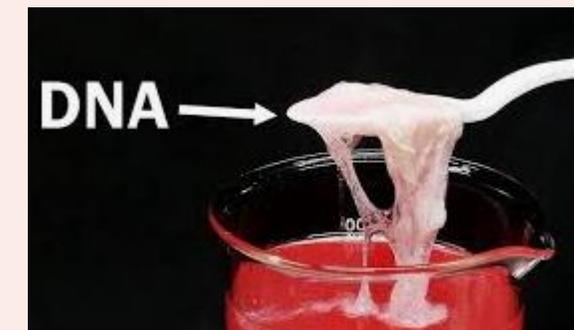
Inherited characteristics are a direct result of genes passed on from parent to offspring.  
Environmental characteristics are a result of external conditions e.g sun on skin tone

## 3. DNA



DNA is a short nickname for deoxyribonucleic acid. DNA is the genetic information inside the body's cells that are instructions to make people who they are

## 4. DNA can be extracted from fruit using washing up liquid and methylated sprits.



# Year 8 – Acids and Alkalis

## Vocabulary

**Acid** - a substance with a pH value of less than 7

**Alkali** - a substance with a pH value of more than 7

**Neutral** - a water solution

**Ph Scale**- Shows how acidic a substance is, scored from 0-14

**Corrosive** - Can burn through the surface

**Indicator** - A chemical that can show if a substance is acidic or alkaline by changing colour.

**Reaction** -a chemical change

**Neutralisation** -a reaction where an acid reacts with an alkali to form a neutral solution of a salt and water.

## Sticky knowledge –

Acids and alkalis are special solutions which are chemical opposites to each other. If a solution is between acid and alkaline, it is neutral. Acids and alkalis are corrosive.

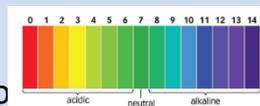


### 1. Find out what an acid is.



An acid is typically, a corrosive or sour-tasting liquid.

### 2. Record observations using the pH scale.



A pH scale to show how acidic or alkaline a liquid is. pH is a number from 0 to 14. From 0 to 7 are acids, with 0 being the strongest acid. From 7 to 14 are alkalis with 14 being the strongest alkali.

### 3. Find out what an alkali is.



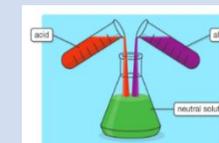
An alkali is a chemical that turns litmus blue, and is typically, a caustic or corrosive and soapy.

### 4. Make an indicator out of plants.



Some plants can be natural indicators and will change colour when added to an acid or alkali.

### 5. Create a neutral solution by adding an acid to an alkali.



When an acid is added to an alkali, they weaken each other and a neutral solution can be reached.

### 6. Investigate the strength of acids in different drinks.



Lots of drinks contain acids. Comparative tests can be planned and set up to find out if there is a difference in strength of acidity.

# Year 8 Chemical reactions

## Vocabulary

**Reaction** – a chemical change between at least two things.

**Reactants** – what is added together to start a reaction.

**Products** – what is made from a reaction.

**Endothermic** – a reaction that decreases in temperature

**Exothermic** – a reaction that increases in temperature.

**Increase** – Get bigger

**Decrease** – Get smaller

## Sticky knowledge

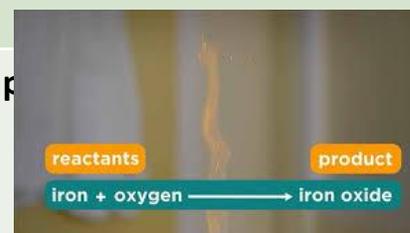
A chemical reaction is usually a permanent change to make a new product.

### 1. Chemical Reactions



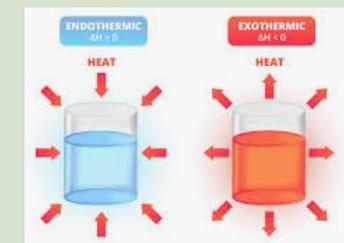
A chemical reaction is a process that leads to the chemical transformation of one set of chemical substances to another. You can observe colour change, change of state etc.

### 2. Reactants and products



The substances that go into a chemical reaction are called the reactants, and the substances produced at the end of the reaction are known as the products

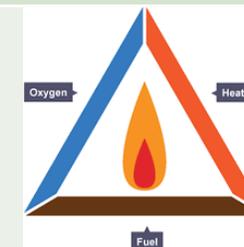
### 3. Exothermic and endothermic reactions



During some chemical reactions, energy is transferred to the surroundings, this is called an exothermic reaction, and the temperature increases.

When energy is taken in from the surroundings, this is called an endothermic reaction and the temperature of the surroundings decreases.

### 4. Combustion



Combustion is the scientific word for burning.

In a combustion reaction a substance reacts with oxygen from the air and transfers energy to the surroundings as light and heat.

# Year 8 Electricity

## Vocabulary

**Series circuit** -one single path for electricity to flow.

**Parallel circuit** - two or more paths for current to flow.

**Component** - Part of a circuit, such as a bulb, switch, buzzer or motor.

**Circuit diagram** -An image which shows all the components and connections in a circuit.

**Circuit symbol**- A diagram for each component

**Voltage** - what pushes the electricity around.

**Current**- The flow of charge through a circuit

**Ammeter**-Component used to measure current in amps

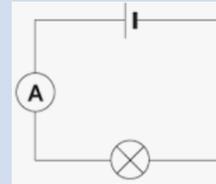
**Voltmeter** - component used to measure voltage in volts.

**Resistance** - How hard it is for the current to flow

## Sticky knowledge

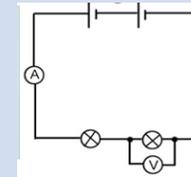
Current is the flow of energy around a circuit that is 'pushed' by voltage.

### 1. Measuring Current in a circuit



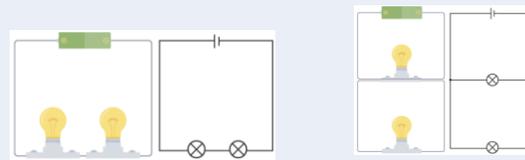
The current in a circuit can be measured using a device called an ammeter which is put into the circuit.

### 3. Measuring voltage (potential difference)



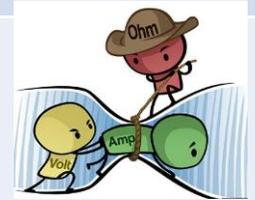
A voltmeter is a device used to measure the potential difference in a circuit. Voltmeters must be placed in parallel with the components.

### 2. Series circuits and parallel circuits



In a series circuit the components are connected end-to-end with the last wire completing the circuit to form the single loop, meaning there is only one path for the current to flow.

### 4. Investigating resistance in circuits



Resistance (R) increases when components, for example a lamp, are added to a circuit in series.

# Year 8 – Plants and photosynthesis

## Sticky Knowledge

Plants make their own food through a process called photosynthesis.



## Vocabulary

**Photosynthesis** – A process of a plant making its own food (glucose) and oxygen.

**Carbon dioxide** - a gas in the air (we breathe it out)

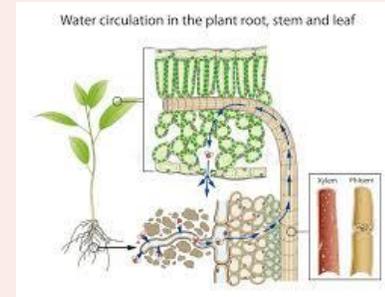
**Oxygen** – A gas in the air (we breathe it in)

**Glucose** – a sugar

**Light intensity** – how much light there is.

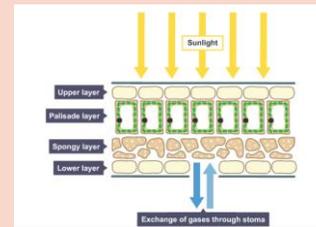
**Chlorophyll** – a chemical found in the leaves that traps the light energy.

### 1. Water transportation in plants



Water is transported from the roots, up the stem to the leaves.

### 2. The leaves



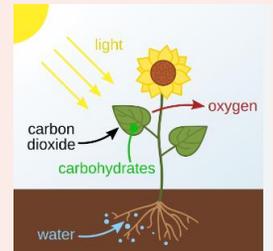
The leaves are adapted to allow gases in and out, retain water and trap the sun's energy.

### 3. Photosynthesis

**Photosynthesis** is the process by which green plants (and some other organisms) absorb light energy using chlorophyll in their leaves to make glucose (a sugar). Almost all organisms on earth are dependent on the process of photosynthesis because this glucose is a basic energy source for them.

The word equation for photosynthesis is:

Carbon dioxide + Water → Glucose + Oxygen



### 4. Factors that affect photosynthesis

#### Limiting factors

The rate of photosynthesis in a plant can be limited by:

- Light intensity
- Availability of Carbon dioxide (CO<sub>2</sub>)
- Availability of water
- Availability of chlorophyll
- Temperature

