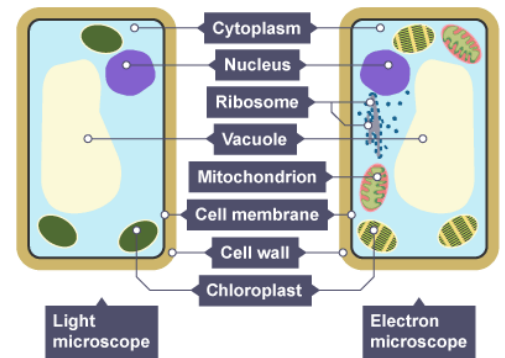
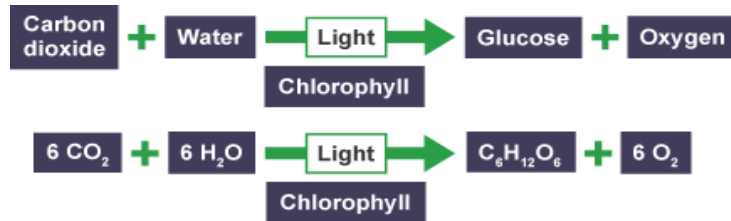


Knowledge Organiser: Y9 Photosynthesis and Ecology

Photosynthesis

Photosynthesis takes place in the **chloroplasts** of plant cells.

Chlorophyll is the green pigment in chloroplasts that absorbs the light needed for photosynthesis.



Glucose is used for **respiration**, converted to **cellulose** (cell walls) and stored as **starch**.

Iodine solution is used to test for starch. If starch is present iodine changes colour from **orange brown** to **blue/black**.

Most photosynthesis takes place in the leaf (which is a plant organ). This is because the palisade cells in the leaf have **lots of chloroplasts**.

Leaves have a **large surface area** to maximise the absorption of light. They are also **thin**, providing a short diffusion pathway for gases.

Stomata are tiny holes, mainly on the lower epidermis that allow the **exchange of gases** (Carbon Dioxide enters and Oxygen leaves). Water is also lost through the stomata.

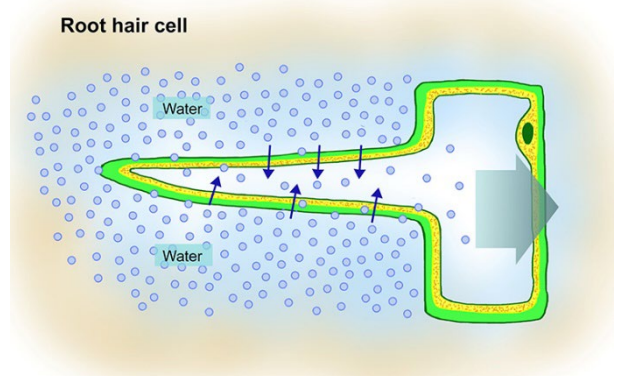
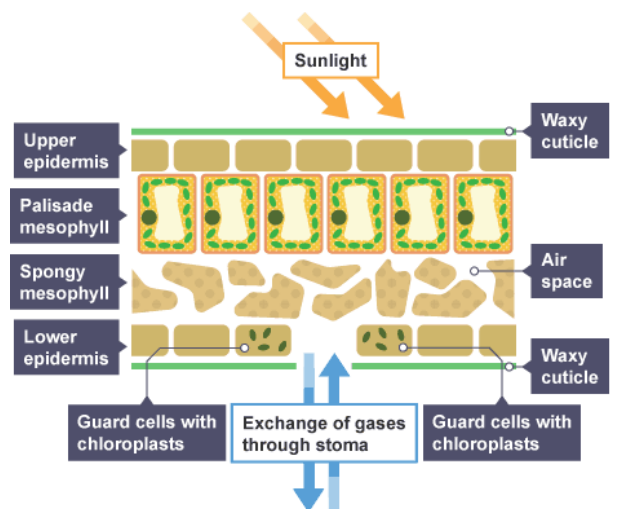
Guard cells control the opening and closing of the stomata.

Root hair cells are specialised cells that take up water from the soil by osmosis.

Root hair cells have long projections which **increase their surface area** meaning more water can be absorbed from the soil. They also have **thin walls**, providing water with a short diffusion pathway.

Osmosis is the diffusion of water molecules from a region where the water molecules are in higher concentration (soil), to a region where they are in lower concentration (inside the roots), through a partially permeable membrane.

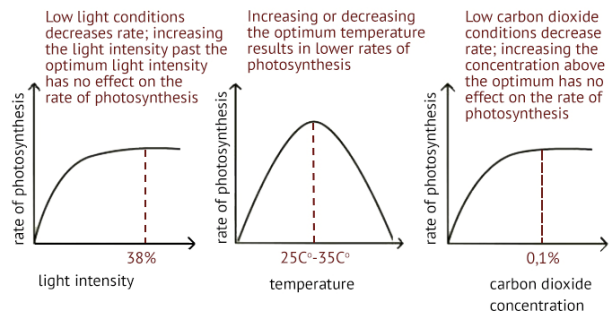
Water then moves from the roots to the leaves for photosynthesis in hollow tubes called **xylem vessels**.



Knowledge Organiser: Y9 Photosynthesis and Ecology

The rate of photosynthesis can be affected by **temperature, light intensity, carbon dioxide concentration** and **chlorophyll levels**.

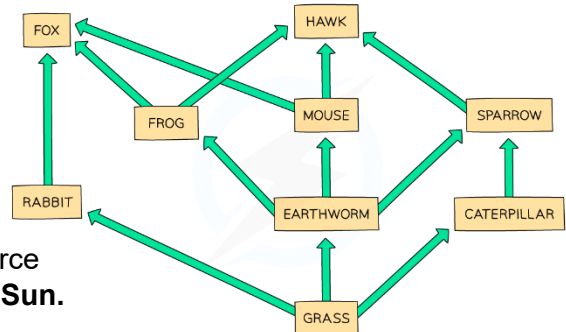
The **rate of photosynthesis** can be investigated by changing one of these variables and counting the **number of bubbles of oxygen** (or volume of oxygen) produced in a specific time.



Ecology

A food chain shows the **transfer of energy** from one organism to the next in an ecosystem.

Food chains start with **producers**. Producers are plants or algae, which photosynthesise (they convert energy from the sun into glucose). Therefore, the source of all energy in a food chain is **light energy from the Sun**.



All animals above the producer are called **consumers** (they eat other plants and/or animals). The first is the primary consumer, the next is the secondary consumer.

Animals that hunt and kill others are called **predators**, and those that are hunted and killed are called **prey**.

A **food web** is a network of interconnected food chains. Food webs show **interdependence** - how the change in one population can affect others within the food web.

Polluting toxins can be taken in by living things if breathed in, consumed in food or water, or through their skin. The build-up of these toxins in the food chain is called **bioaccumulation**. Because the toxins cannot be excreted, they are found in much **higher concentrations** in the organism at the top of the food chain, and the effects are much more severe. Examples include **mercury** in the sea and **DDT** on land.

Sampling Techniques

A small section of a population is investigated. The numbers of organisms are counted within a sample site, and then the **results multiplied to estimate the total number in the entire habitat**.

Quadrats are square frames of wire. These are placed on the ground and can be used to investigate the number of an individual species, the number of different species, or percentage cover. Quadrats must be placed randomly using **random coordinates**.

Sometimes we want to see if the number of a species or percentage cover changes within an area. A quadrat could be placed at regular distances, for example every five metres, along an imaginary line called a **transect**.

