

# Science

## Year 9 Fundamentals: Plants

### While you were away.

#### Lesson 1: Photosynthesis

1. Write the word equation for photosynthesis
2. What type of energy is used in photosynthesis
3. Where does photosynthesis occur in a cell?

#### Lesson 2: Plant tissues

1. What is the role of the palisade layer in a leaf:
2. What is the role of the spongy mesophyll layer?
3. How are leaves adapted for photosynthesis?

#### Lesson 3: Plant tissues

1. What are the stomata?
2. What is the role of the stomata?
3. What cells cause the stomata to open/close?

#### Lesson 4 Plant organ systems

1. What is the role of the xylem tissue?
2. What is the role of the phloem tissue?

#### Lesson 5: Transpiration

1. How does water enter a plant?
2. Name the specialised cells that absorb water.
3. What tissue does water travel in?
4. How is water lost through a leaf?

#### Lesson 6: Communities

1. What is an ecosystem?
2. what is a community
3. What resources do living things compete for?

#### Lesson 7: Biotic and abiotic factors

1. What is a biotic factor?
2. What is an abiotic factor?

#### Lesson 8: Adaptations

1. What are the 3 types of adaptations?
2. How are these adaptations passed on?

#### Lesson 9: Levels of organisation

1. What is always at the start of a food chain?
2. What is a predator?
3. What does the arrow in a food chain represent?

# SUBJECT: Science

## UNIT: Year 9 Fundamentals: Plants



### Photosynthesis

Photosynthesis is a **chemical** reaction which takes place in plants.  
Carbon dioxide + Water → Glucose + Oxygen

### Photosynthesis

It uses **light** energy to power the chemical reaction which is absorbed by the green pigment **chlorophyll**. This means that photosynthesis is an example of an **endothermic** reaction. The whole reaction takes place inside the **chloroplasts** which are small organelles found in plant cells.

Plants acquire carbon dioxide via diffusion through the **stomata** of their leaves. The water is absorbed from the **soil** through the roots and transported to the cells carrying out photosynthesis via the **xylem**.

### Abiotic and Biotic factors.

Abiotic factors are the non-living factors of an environment. E.g. moisture, light, temperature, CO<sub>2</sub>, or pH.

Biotic factors are the living factors of an environment, e.g. predators, competition, pathogens, availability of food.

### Parts of a Leaf

Waxy Cuticle: reduces water loss from the plant.  
Palisade Layer: where photosynthesis occurs.  
Spongy Mesophyll: Air spaces for gas exchange.  
Stomata: gaps in the bottom of the leaf where gases enter.  
Guard Cells: open and close the stomata to change the rate of gas exchange.

### Xylem and Phloem

Xylem transports water through the plant from roots to leaves. They are made of dead, lignified cells, which are joined end to end with no walls between them. The movement of water is known as transpiration.  
Phloem vessels transport food such as dissolved sugars and glucose from photosynthesis. The food is transported around the plant to where growth is occurring as well as to the organs which store the food. The transport occurs in all directions.

### Root hair cells

Plants absorb water through osmosis in the root hair cells. They have a large surface area, a narrow shape for a short diffusion pathway and lots of mitochondria.

### Communities

An ecosystem is the interaction of a community of living organisms (biotic) with the non-living (abiotic) parts of their environment. To survive and reproduce, organisms require a supply of materials from their surroundings and from the other living organisms there. Plants in a community or habitat often compete with each other for light and space, and for water and mineral ions from the soil. Animals often compete with each other for food, mates and territory. Within a community each species depends on other species for food, shelter, pollination, seed dispersal etc. If one species is removed it can affect the whole community. This is called interdependence. A stable community is one where all the species and environmental factors are in balance so that population sizes remain fairly constant.

### Levels of Organisation

All food chains start with a producer (plants or algae) that use the sun's energy to make glucose by photosynthesis.  
The living organisms use the energy to produce biomass and grow.  
When a secondary consumer (predator) consumes the herbivore some of the biomass and energy is transferred. Some of the energy is lost.  
The arrow in the food chain shows the direction of the energy.  
Population of predators and prey increase and decrease in cycles. The size of the predator population depends on the size of the prey population to maintain a stable community.

### Ambitious Vocabulary

Community,  
Ecosystem,

### Plant Tissues

Leaves are plant organs where the main function is photosynthesis occurs. This happens in the chloroplasts which are full of chlorophyll (a green pigment).  
Leaves are adapted to carry out photosynthesis by being typically thin with a large surface area to increase the rate of gas exchange via diffusion. Gases enter the leaf via the stomata at the bottom of the leaf. Stomata have guard cells on either side to open or close the air space.

### Adaptations

Adaptations are specific features of an organism which enable them to survive in the conditions of their habitat. Adaptations can be structural – features of the organism's body. Behavioural – how the organism behaves, Functional – ways the physiological processes work in the organism.

A plant or animal will not physically change to adapt to its environment in its lifetime. Instead, there is a natural variation within the species and only organisms whose features are more advantageous in the environment survive. The survivors then go on to reproduce and pass on their features to some of their offspring. The offspring who inherit these features are better equipped to survive.