

# 2.3.1 Plant tissues

## AQA GCSE Biology (Higher) Question and answer notes

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### How to use these notes

These notes cover everything you need to know for this part of the specification. They have been written in question-answer format to make them easier for you to study from.

In order to study successfully, I recommend you do the following for each question and answer:

- Read it carefully and make sure you **understand** it.
- **Memorise** the answer.
- **Practice** applying your understanding to past exam questions.

A good way to memorise information is to use **retrieval practice**. This is when you practise retrieving information from your memory. You could do this by making a flashcard for each question with the question on one side and the answer on the other. Or you could use a flashcard app. Alternatively, use a sheet of paper to cover up the answer so you can only see the question. Try to answer the question and then check how you did.

You should practise retrieving each answer from your memory until you can do it perfectly. Even once you can retrieve the answer perfectly, your ability to retrieve it will probably fade as time passes without practising. Therefore you will need to keep going back to the questions that you have previously mastered and practising them again. However, each time you re-learn the answer, the memory will be stronger and will last longer than the time before.

### What are the main types of plant tissue?

The main types of plant tissue are:

- Epidermal tissue
- Palisade mesophyll tissue
- Spongy mesophyll tissue
- Xylem
- Phloem
- Meristem tissue

### How are the tissues arranged in a leaf?

The tissues in a leaf are arranged as shown below. As well as the tissues shown below, leaves also contain xylem and phloem tissue.

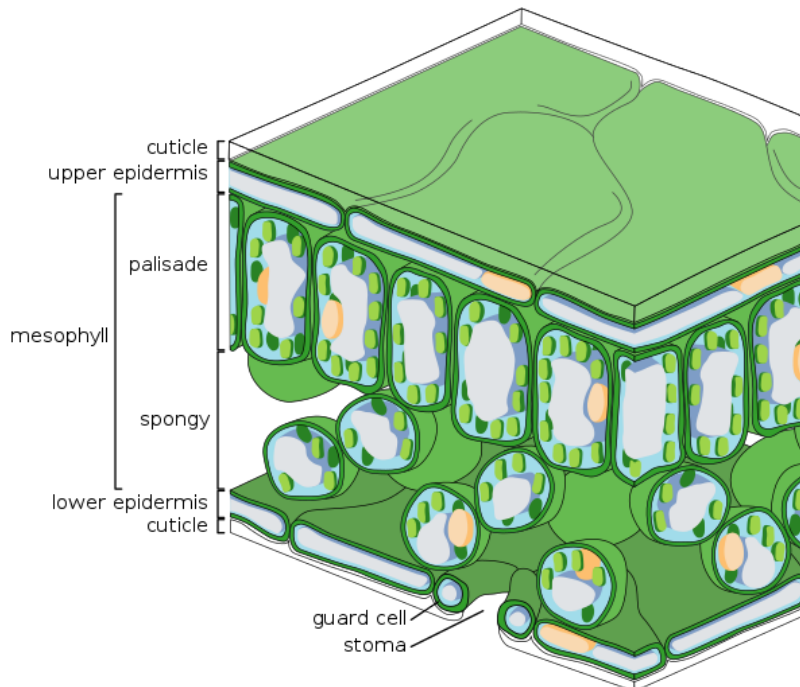


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### What is epidermal tissue?

Epidermal tissue is tissue that covers the outer surface of the plant, including the tops and bottoms of leaves. Epidermal tissue protects the plant.

### How is epidermal tissue adapted for its function?

In leaves, the cells of the epidermis secrete waxy substances which form a waterproof layer called the cuticle which stops the leaf from drying out.

### What is palisade mesophyll tissue?

Palisade mesophyll tissue is the tissue in leaves where most of the photosynthesis takes place.

### How is palisade mesophyll tissue adapted for its function?

The cells of palisade mesophyll tissue are densely packed with chloroplasts, which allows them to carry out their function of photosynthesising.

### What is spongy mesophyll tissue?

Spongy mesophyll tissue is a tissue in leaves which gases diffuse through as they move in and out of the leaf.

### How is spongy mesophyll tissue adapted for its function?

Spongy mesophyll tissue has large air spaces to allow gases to diffuse easily through it.

**What is xylem tissue?**

Xylem tissue is tissue found throughout the plant which transports water and mineral ions from the roots to the rest of the plant.

**How is xylem tissue adapted for its function?**

Xylem tissue consists of long tubes made up of chains of dead, hollow cells with no end walls. Because the cells are hollow and have no end walls, it is easy for water and mineral ions to move through. The cell walls contain lignin, which waterproofs them, stopping water from leaking out of the xylem. The lignin also strengthens the xylem, preventing it from collapsing.

**What is phloem tissue?**

Phloem tissue is tissue found throughout the plant which transports sugar from the leaves to the rest of the plant. Phloem tissue is made up of sieve tube elements, which transport sugar, and companion cells, which support sieve tube elements. The sieve tube elements are stacked on top of each other to form long tubes. The companion cells are next to sieve tube elements.

**How is phloem tissue adapted for its function?**

Sieve tube elements have holes in their end walls to allow sugar to travel from cell to cell, and they have no nuclei, making more space for sugar to move through. Companion cells have many mitochondria which enables them to supply the sieve tube elements with energy for the transport of sugar.

**What is meristem tissue?**

Meristem tissue is tissue found at the tips of root and shoots which contains stem cells. These cells divide and differentiate to form all other cell types, which allows the plant to grow and develop.

**What are stomata?**

Stomata are tiny pores (holes) in the surface of the leaf, which allow gas exchange to take place. The stomata can be opened and closed. When the stomata are open, carbon dioxide diffuses into the leaf through the stomata and can then be used in photosynthesis. However, water diffuses out of the leaf through the stomata, meaning that it must be replaced by water absorbed from the soil by the roots.

**What is the singular of 'stomata'?**

The singular of 'stomata' is 'stoma'.

**What are guard cells?**

Guard cells are cells which surround the stomata and control their opening and closing. Each stoma is surrounded by a pair of guard cells, which can change shape in order to open or close the stoma.