

# Leaf Structure

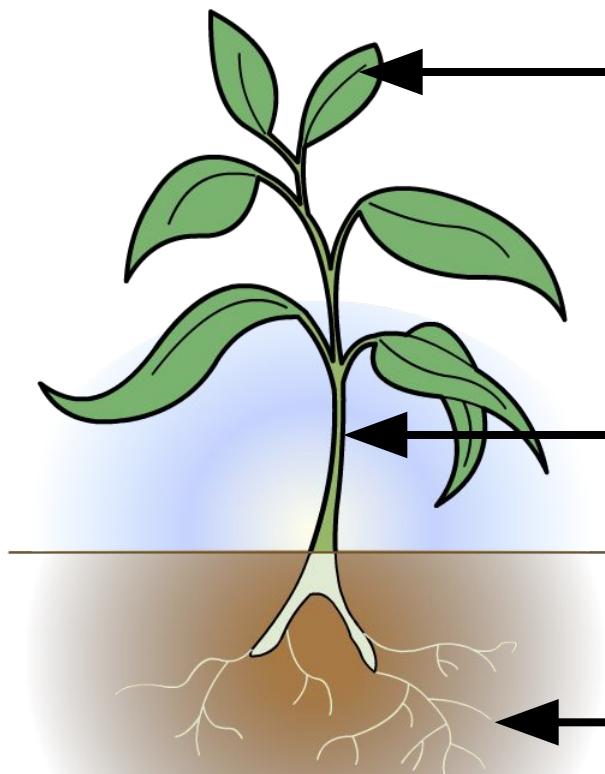
## Learning Objectives:-

1. Recall the photosynthesis equation and symbol equation
2. Describe structure of the leaf
3. Describe and explain the functions of the various tissues within the leaf

Examiner tip – ensure you know the sequence for multi-cellular organisms (the order is same in plants and animals though the cells, tissues etc differ)

# SKETCH THE PLANT AND ADD THE LABELS FILLING IN THE MISSING WORDS

The structures of cells and tissue in different parts of the plant are adapted to allow transportation of essential materials.



\_\_\_\_\_ are entry and exit points for the \_\_\_\_\_ needed by plants.

\_\_\_\_\_ connect the \_\_\_\_\_ to the \_\_\_\_\_, flowers and fruits. They contain \_\_\_\_\_ specially adapted for transportation of \_\_\_\_\_, minerals and \_\_\_\_\_.

\_\_\_\_\_ absorb \_\_\_\_\_ and \_\_\_\_\_ from the soil.



## Match the parts of the plant to their function

root

entry and exit point of gases

leaf

absorbs water and minerals from the soil

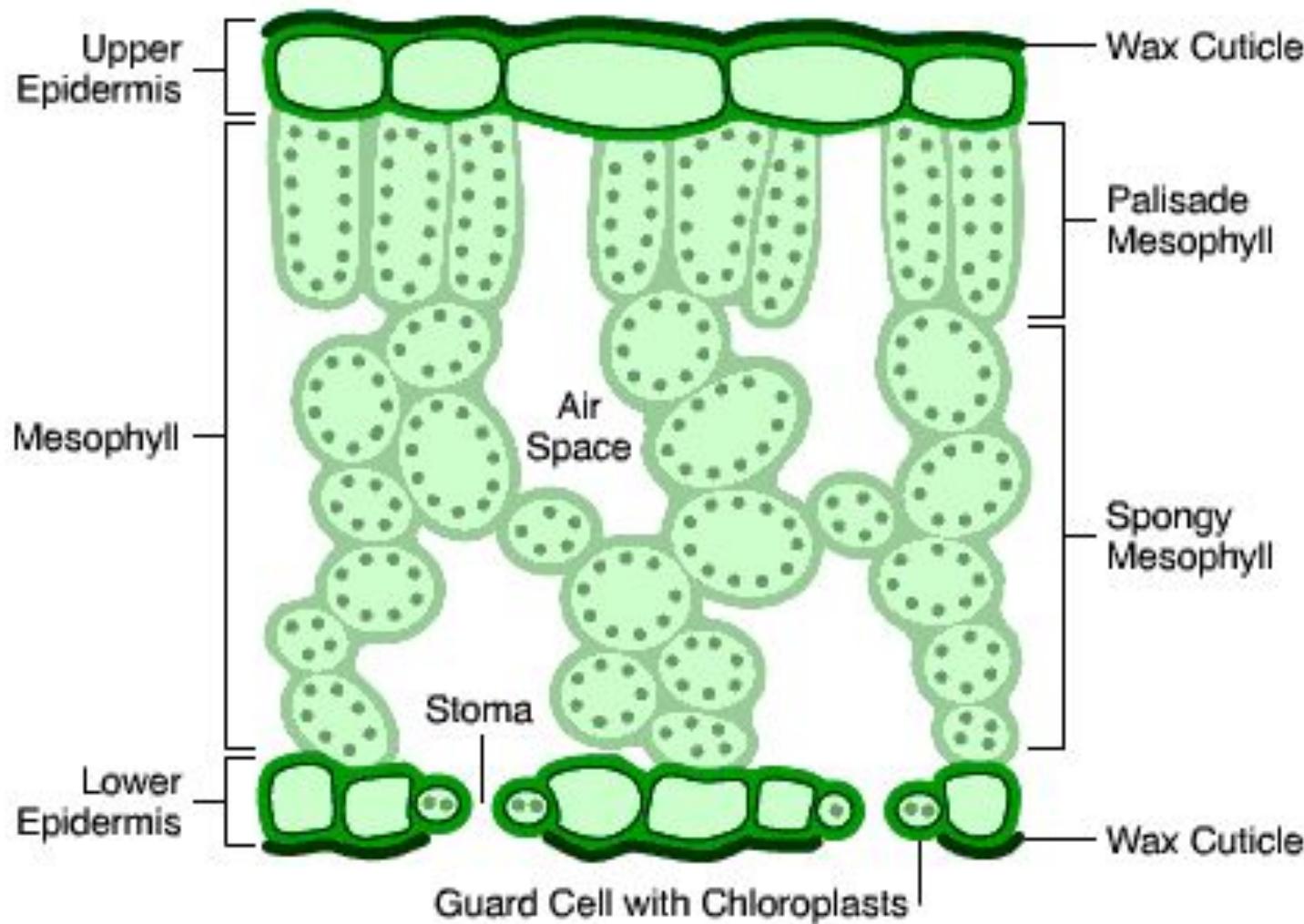
stem

connects the upper and lower parts of plants

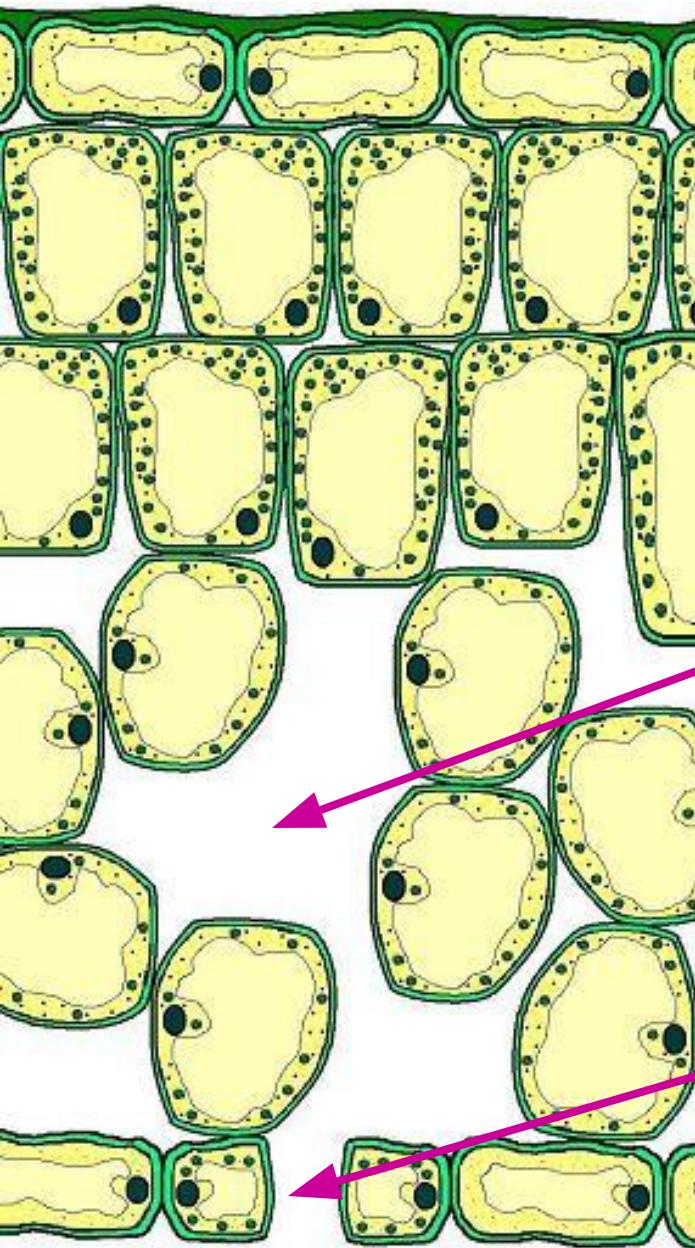
?

solve





# Leaf Structure



Waxy cuticle

Epidermis

Palisade mesophyll layer

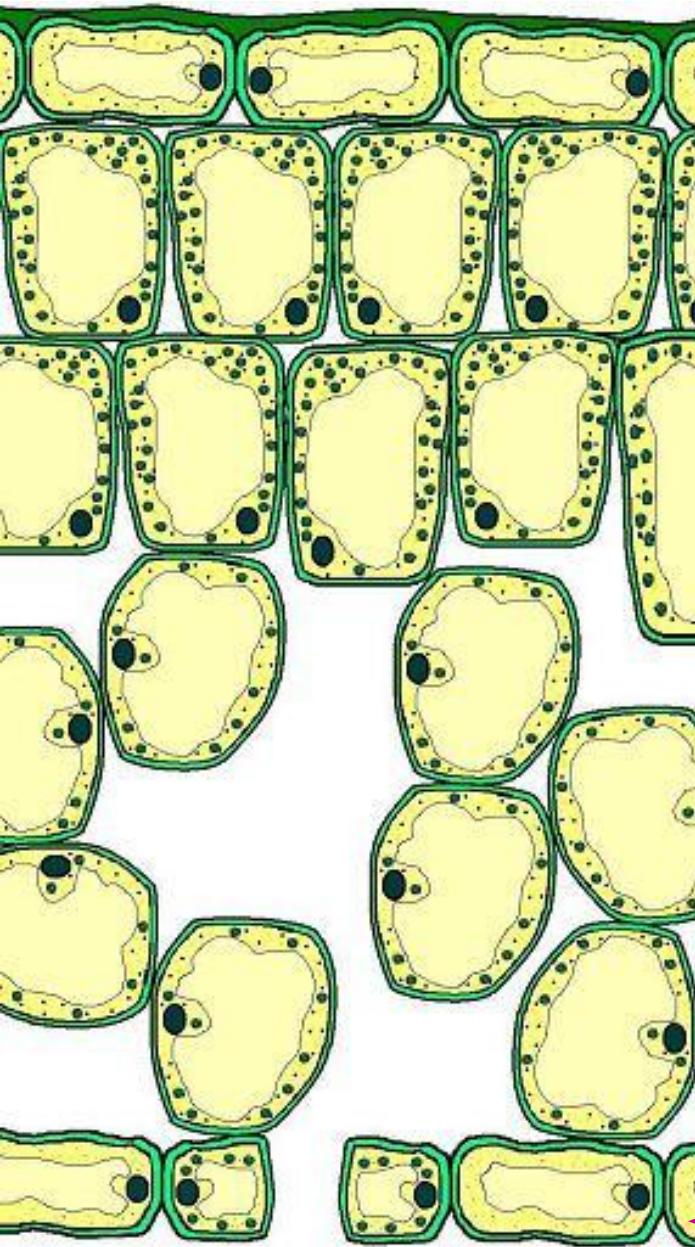
Air space

Spongy mesophyll layer

Stomata

Epidermis

# Waxy Cuticle & Epidermis



Waxy cuticle

Upper Epidermis

The **waxy cuticle** is a thin layer atop the epidermis.

Its function is to **reduce the water lost** from the leaf.

In arid (dry) conditions this cuticle layer can be quite thick.

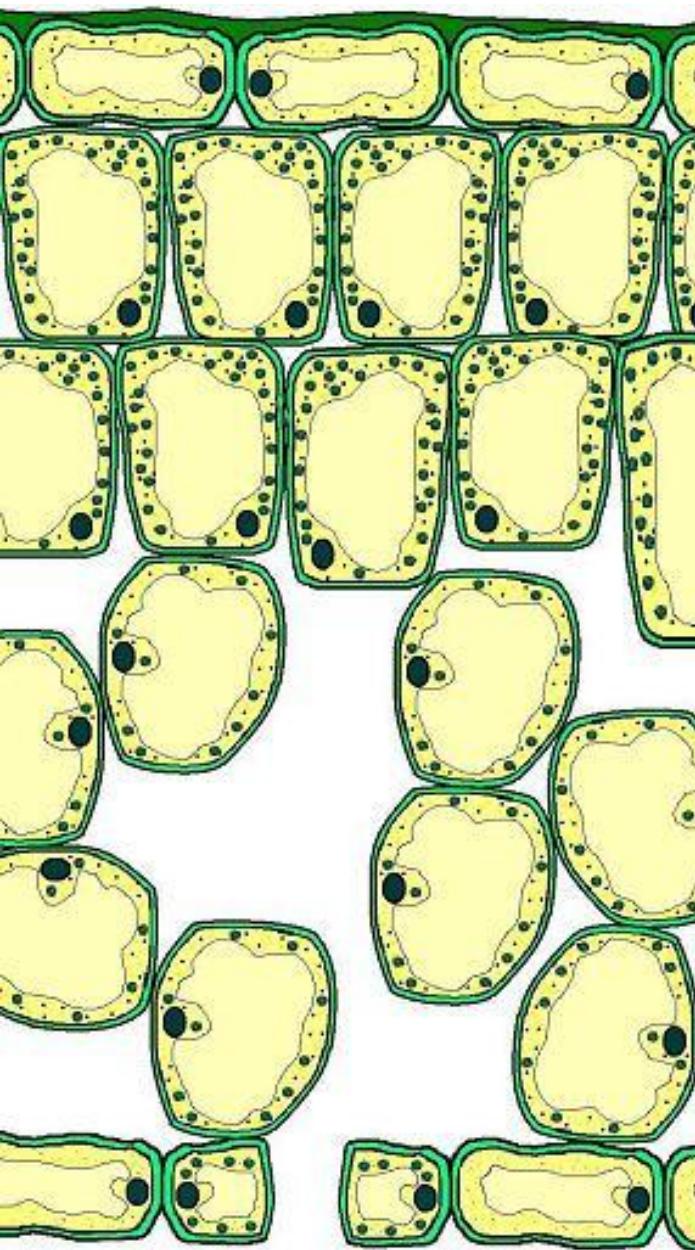
**Epidermis cells contain no chloroplasts** – not true of the stoma cells.

They form layers on the upper and lower surfaces of the leaf.

Their function is to **prevent water getting out** and **stopping unwanted substances/organisms getting in**.

Lower Epidermis

# Palisade Mesophyll Layer



The **palisade mesophyll layer** is where **most of the photosynthesis** occurs in the leaf.

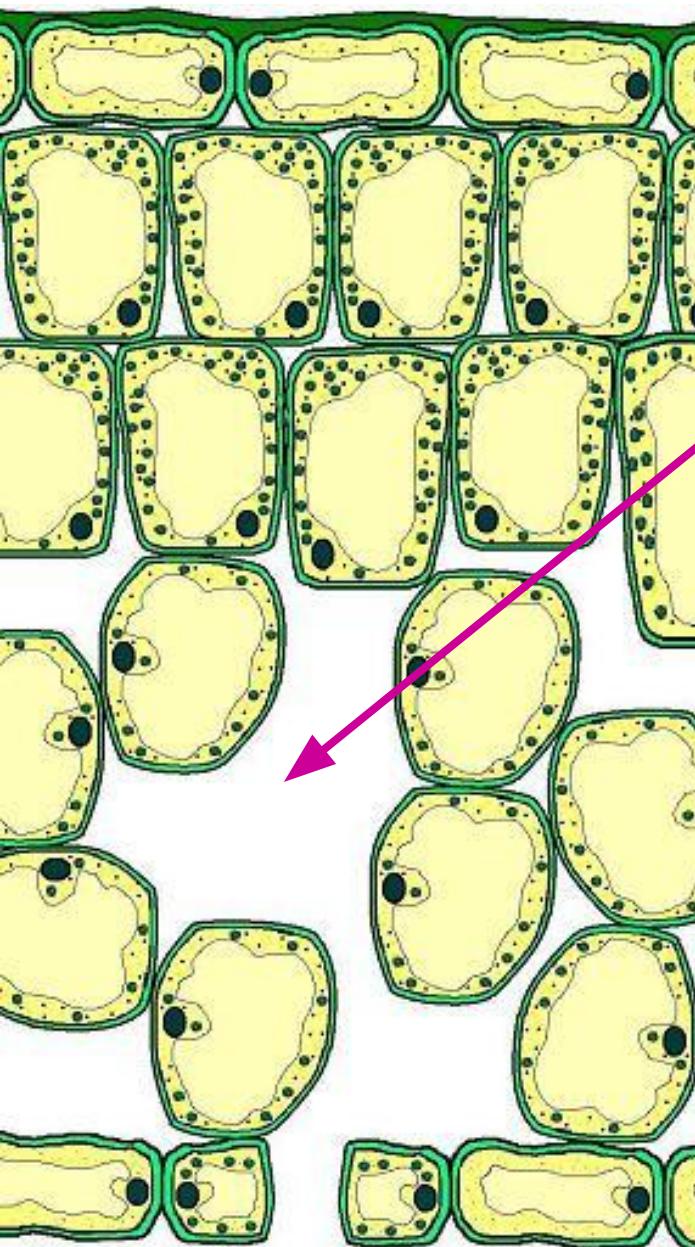
← Palisade mesophyll layer

The palisade cells contain **a lot of chloroplasts** to help them perform this photosynthesis.

The palisade cells **are closely packed together** to maximize light absorption.

In the leaf cross-section we can see the palisade cells are **only found in the upper part of the leaf**.

# Spongy Mesophyll Layer and air spaces



The cells in the **spongy mesophyll layer** are **not as closely packed** as the cells in the palisade mesophyll layer.

## ***air spaces***

This creates ***air spaces*** inside the leaf to enable ***gases to move in and out***.

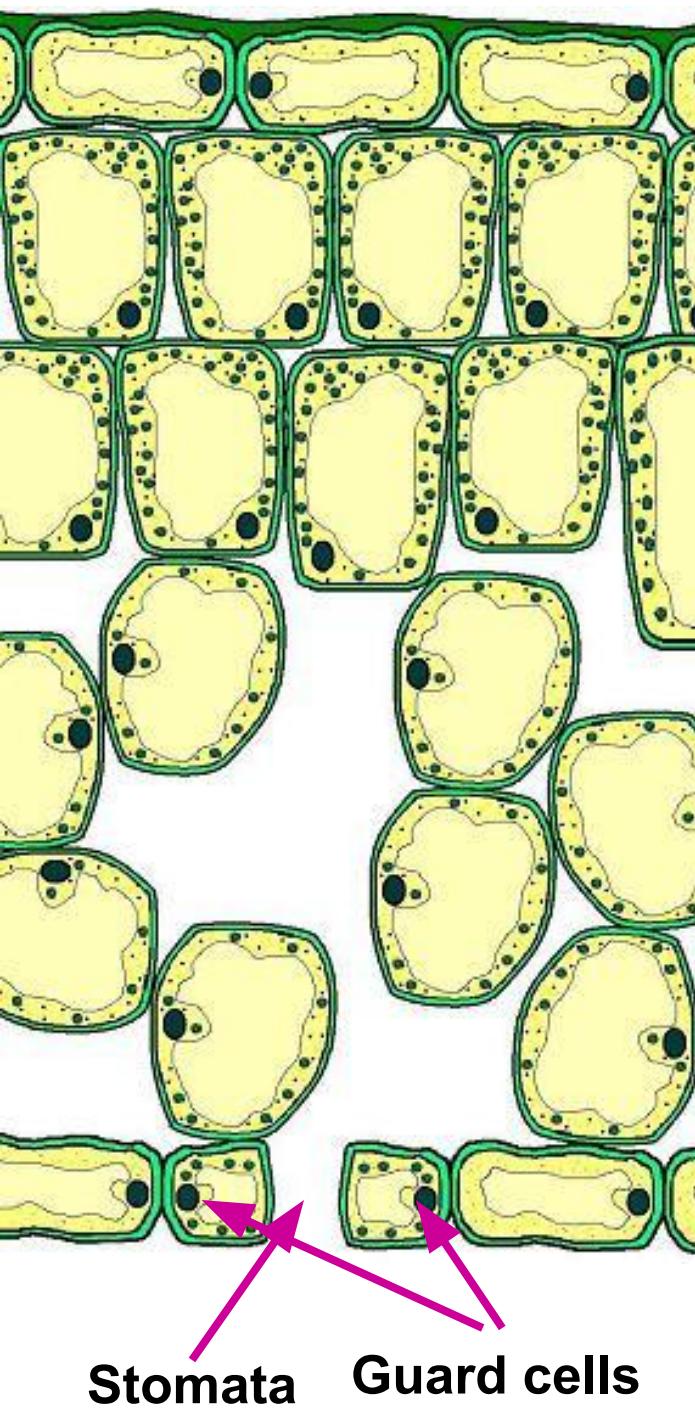
## **Spongy mesophyll layer**

There are ***not as many chloroplasts*** in the spongy mesophyll cells as there are in the palisade mesophyll cells .

There is a thin layer of water on the surface of the mesophyll cells.

# Swapping over – Gaseous exchange

- A leaf is very thin so its centre is quite close to the outside.
- The larger intercellular spaces mean that air can move easily between the cells.
- Diffusion is fast enough to supply gases to all the cells.
- The gases diffuse through the epidermis and stomata into the intercellular spaces.
- Here they dissolve in the water layer and diffuse into the mesophyll cells through the cell wall and cell membrane.



# Stomata and guard cells

There are holes found in leaves called **stoma**.

These holes allows **gases to diffuse in and out of the leaves**.

The stoma are formed by **two highly specialized epidermis cells**.

These cells, called **guard cells**, are the only epidermis cells that contain chloroplasts.

The **stoma open and close** depending upon the requirements of the plant.

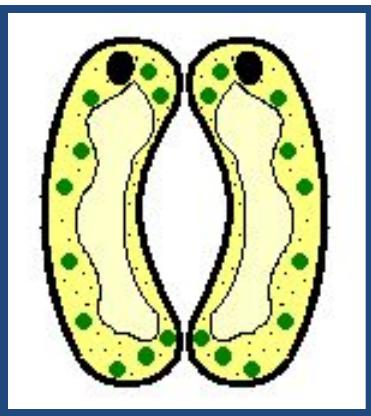
It is through these stoma that **water** leaves the leaf, the process that powers **transpiration**.

Task- see all the slides around the summarizing the function of each of the tissues in the leaf.

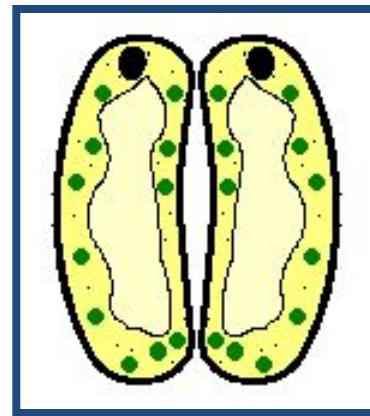
In your own words describe and explain the function of this tissue in the leaf (max 2 sentences)

# Plant organ: the leaf

# Stomata



*Stomata open*



*Stomata closed*

*During photosynthesis  
carbon dioxide diffuses in  
and oxygen diffuses out*

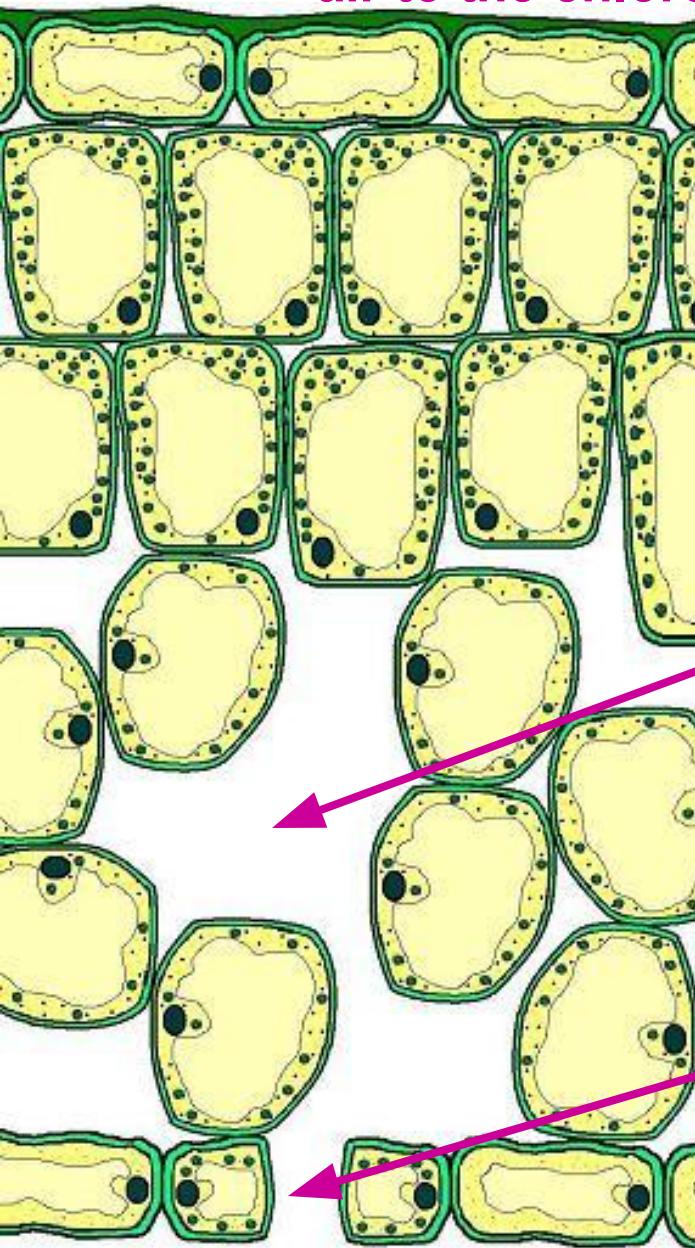
*When the stomata are  
closed, often at night or in  
a humid environment, this  
stops gases diffusing in  
and out of the leaf*

When do you think photosynthesis and respiration happen?

# Day and night

- Main function of leaves is photosynthesis – this takes place in light
- Carbon dioxide + water  $\longrightarrow$  oxygen + sugar
- Plants carry out respiration all the time:
- Oxygen + sugar  $\longrightarrow$  carbon dioxide + water

# Task: Journey of the carbon dioxide molecule from the air to the chloroplast in the palisade cell



1. Waxy cuticle

2. Epidermis

3. Palisade mesophyll layer

4. Air space

5. Spongy mesophyll layer

6. Stomata

7. Epidermis

Bullet points  
Steps  
Story  
Flow chart  
Cartoon strip

# Answer: pathway of a carbon dioxide molecule

- Carbon dioxide in the air
- Stomata
- Air spaces
- Spongy mesophyll layer
- Palisade layer -> palisade cell -> chloroplast
- OXYGEN is the opposite

## PLENARY: Name the layer or describe structure. Explain the function.

