

2.3.2 Plant organ system

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 path does water take as it moves through a plant?

Water from the soil is absorbed by cells in the roots called root hair cells. The water then enters the xylem inside the roots. The water then travels up the plant through the xylem. As the water travels up the plant, some of it diffuses out of the xylem into the various tissues of the plant. Eventually, the last of the water reaches the leaves where it diffuses out of the xylem into the cells. Water diffuses out of the cells of the leaves into the air spaces in the spongy mesophyll. Water then diffuses out of the plant through the stomata and into the surrounding air.

What is the function of a root hair cell?

The function of a root hair cell is to absorb water and mineral ions from the soil.

By what process does a root hair cell absorb water?

A root hair cell absorbs water through osmosis.

By what process does a root hair cell absorb mineral ions?

A root hair cell absorbs mineral ions by active transport.

What adaptations does a root hair cell have that enable it to carry out its function?

A root hair cell has the following adaptations: a root hair (a long, hair-like structure) sticking out into the soil, a thin cell wall, a large vacuole, and a large number of mitochondria.

How does the root hair enable the root hair cell to carry out its function?

The root hair greatly increases the surface area for the absorption of water and mineral ions.

How does having a thin cell wall enable a root hair cell to carry out its function?

Having a thin cell wall reduces the distance that water and mineral ions have to travel to enter the cell, which enables them to be absorbed more quickly.

How does having a large vacuole enable a root hair cell to carry out its function?

The large vacuole in a root hair cell enables it to store the water that it absorbs.

How does having many mitochondria enable a root hair cell to carry out its function?

A root hair cell's many mitochondria carry out aerobic respiration to release energy from food molecules. This energy is used to actively transport mineral ions into the cell.

What is xylem tissue?

[See Notes for 2.3.1 Plant Tissues]

How is xylem tissue adapted for its function?

[See Notes for 2.3.1 Plant Tissues]

What is phloem tissue?

[See Notes for 2.3.1 Plant Tissues]

How is phloem tissue adapted for its function?

[See Notes for 2.3.1 Plant Tissues]

What is transpiration?

Transpiration is the evaporation of water from a plant. Most transpiration takes place in the form of water vapour evaporating out of the leaves through the stomata.

Which factors affect the rate of transpiration?

The following factors affect the rate of transpiration:

- Temperature
- Humidity (the concentration of water in the air around the plant)
- Wind speed
- Light intensity

Describe the effect of temperature on the rate of transpiration.

The higher the temperature, the higher the rate of transpiration.

Explain the effect of temperature on the rate of transpiration.

As the temperature increases, the kinetic energy of the water molecules increases, meaning that they diffuse out of the leaf more quickly.

Describe the effect of humidity on the rate of transpiration.

The higher the humidity, the lower the rate of transpiration.

Explain the effect of humidity on the rate of transpiration.

As the humidity increases, the concentration gradient for water between the inside of the leaf and the outside of the leaf decreases. Therefore, water diffuses out of the leaf more slowly.

Describe the effect of wind speed on the rate of transpiration.

The higher the wind speed, the higher the rate of transpiration.

Explain the effect of wind speed on the rate of transpiration.

As water diffuses out of the leaf, it enters the layer of air on the outer surface of the leaf, causing the water concentration in that layer of air to increase (making it more humid). Wind blows this layer of air away, replacing it with fresh air. The higher the wind speed, the more quickly the humid air is blown away and replaced, and therefore the higher the concentration gradient, resulting in a higher rate of transpiration.

Describe the effect of light intensity on the rate of transpiration.

The higher the light intensity, the higher the rate of transpiration.

Explain the effect of light intensity on the rate of transpiration.

Higher light intensity provides a greater opportunity for photosynthesis. Therefore, as light intensity increases, the plant opens its stomata more to let in carbon dioxide for photosynthesis. This increased opening of the stomata allows water to diffuse out of the leaf at a greater rate.

What is translocation?

Translocation is the movement of dissolved sugars and other food molecules through the phloem. This movement is usually from the leaves - which make food molecules through photosynthesis - to the rest of the plant.