Combined Science - Biology - KS4

Cell Biology

Specialised cells

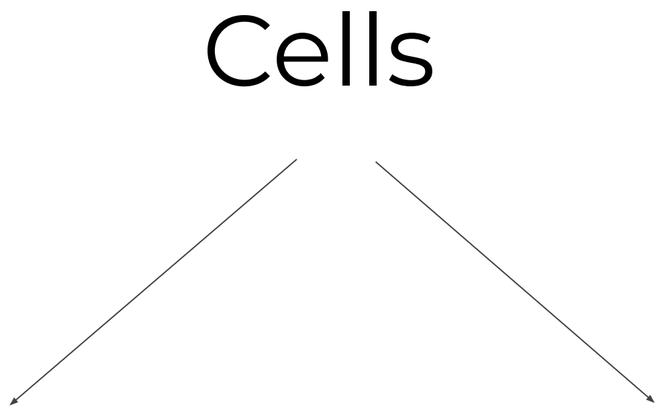
(Downloadable student document)

Miss Wong

OAK NATIONAL ACADEMY

Revising the structure of cells

Recap: Different types of cells



Prokaryotic cells

These are cells without a nucleus.

Eukaryotic cells

These are cells with a nucleus.

Recap task:

Sub-cellular structures	Function
	Make proteins.
	Release energy.
	Provide support to plant cells when filled with water (turgid).
	Contains extra genetic information that is not essential for survival.

Answers to recap task:

Sub-cellular structures	Function
Ribosomes	Make proteins.
Mitochondria	Release energy.
Vacuole	Provide support to plant cells when filled with water (turgid).
Plasmid	Contains extra genetic information that is not essential for survival.

Specialised cells and their formation

Specialised cells are cells with specific features to perform a particular function.

Answers to recap task:

All cells in our body are derived from stem cells.
These cells are very simple cells without any adaptation.

Stem cells are able to change and transform into other types of cells found in the body. **This process is cell differentiation** and is in charge of the development of all of the cells in one's body.

Quick recap:

1. What is a specialised cell?
2. What are stem cells?
3. How do specialised cell form from stem cell?

Answer to specialised cell

1. Specialised cells are cells with specific features to perform a particular function.

2. Stem cells are very simple cells. They are not specialised and they do not have special features.

3. Stem cells differentiates to form specialised cell.

Examples of specialised cells and their functions

Red blood cell

Contains chemical **haemoglobin** that binds with oxygen.

There is **no nucleus** so there is more room to hold more oxygen.

The **biconcave** shape increases the surface area.

Nerve cell

Many dendrites to **form many connections** with many other nerve cell.

The cell is **long** to allow transmission of nerve impulses at a long distance.

Fatty tissue surround the cell to speed up transmission.

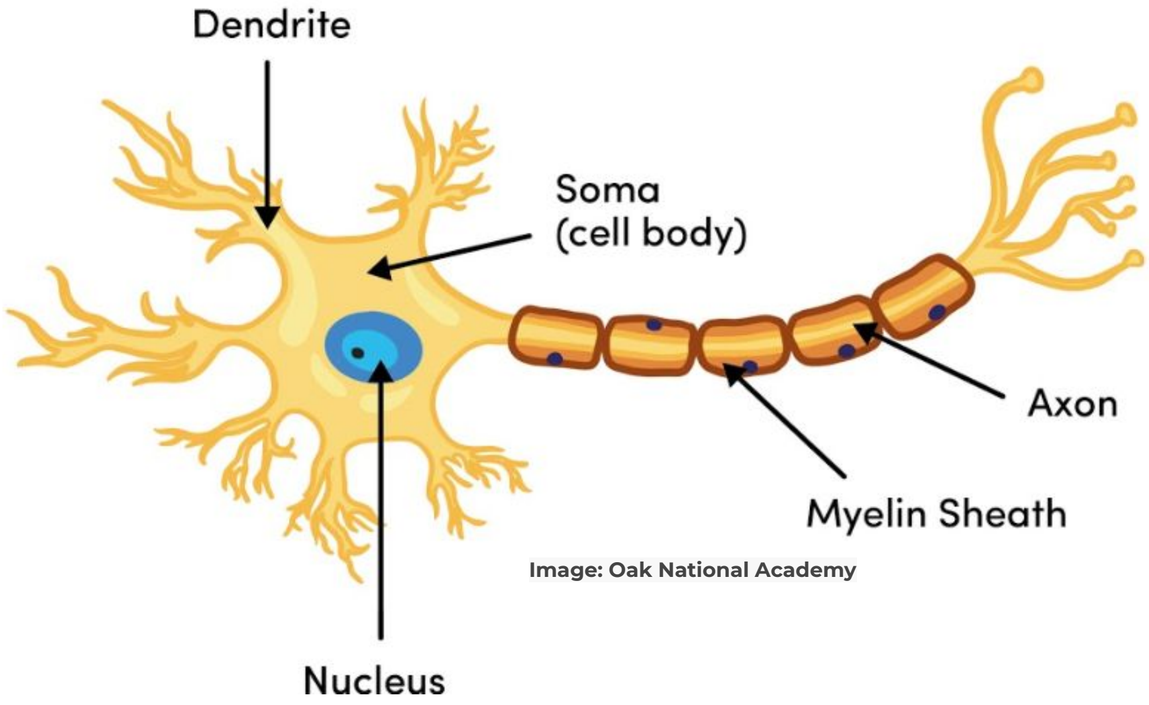


Image: Oak National Academy

Sperm cell

Tail/ flagellum

The mid piece is **full of mitochondria**.

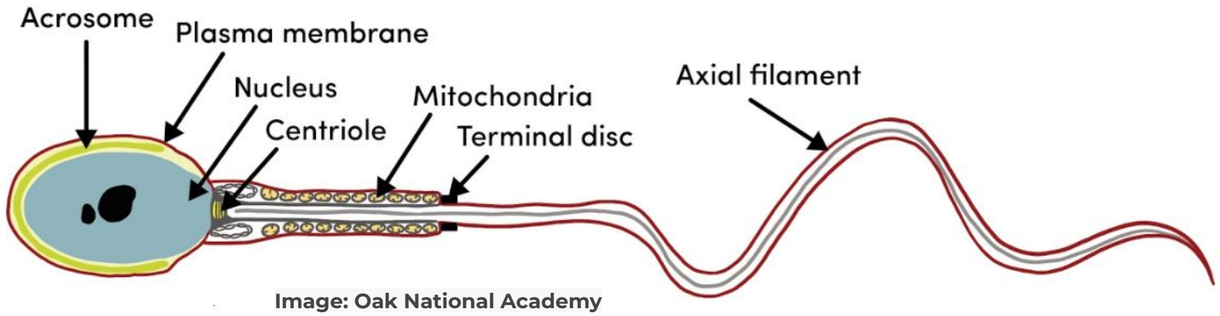


Image: Oak National Academy

The nucleus is located here. The genetic material is found here.

Muscle cells

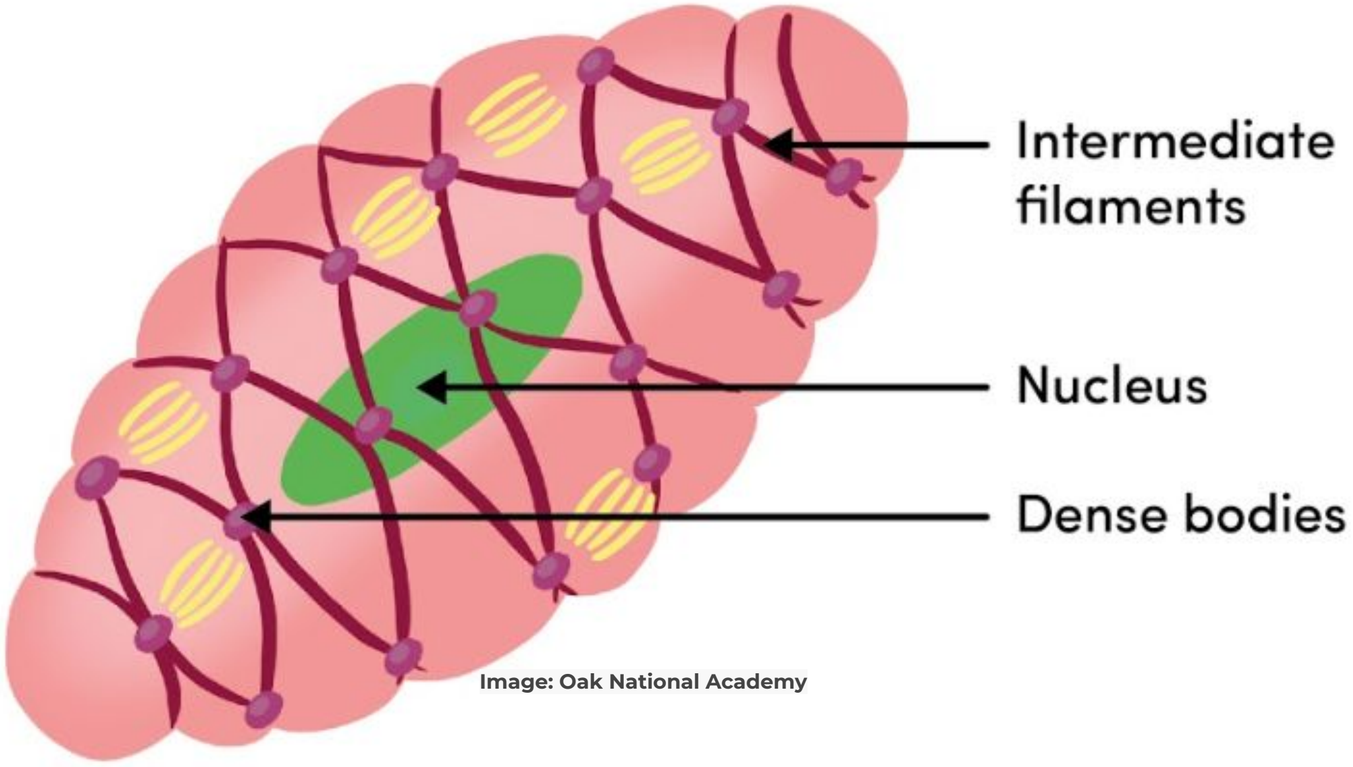


Image: Oak National Academy

Many muscle cells group together to form a muscle tissue.

The muscle cells **contain a lot of mitochondria** to release more energy than other cells.

Quick concept check

1. Why do muscle cells contain many mitochondria?
2. Why is the nerve cell long?
3. Why does the sperm has a tail?

Answer to concept check

1. Many mitochondria are present to release more energy for movement.

2. Nerve cells are long to allow nerve signals to be passed over long distances.

3. The sperm has a tail so it can swim to the egg.

Root hair cell

Root hair cells has a large surface area to absorb water and minerals.

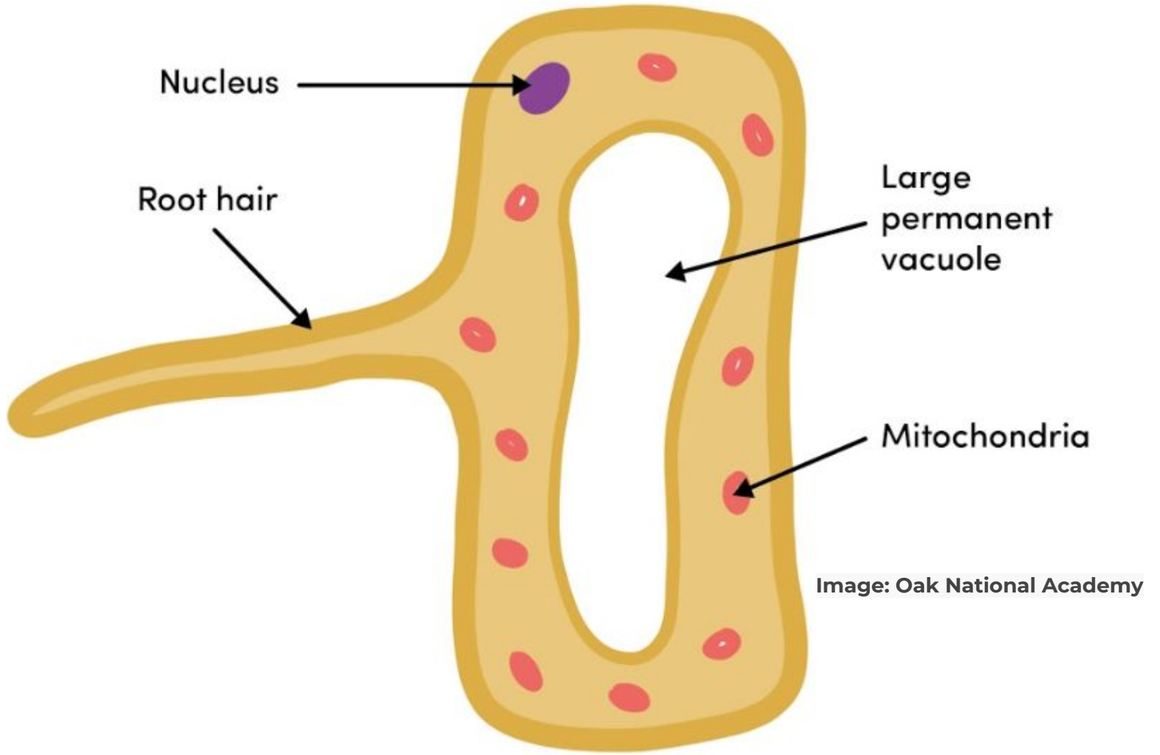


Image: Oak National Academy

Palisade cell

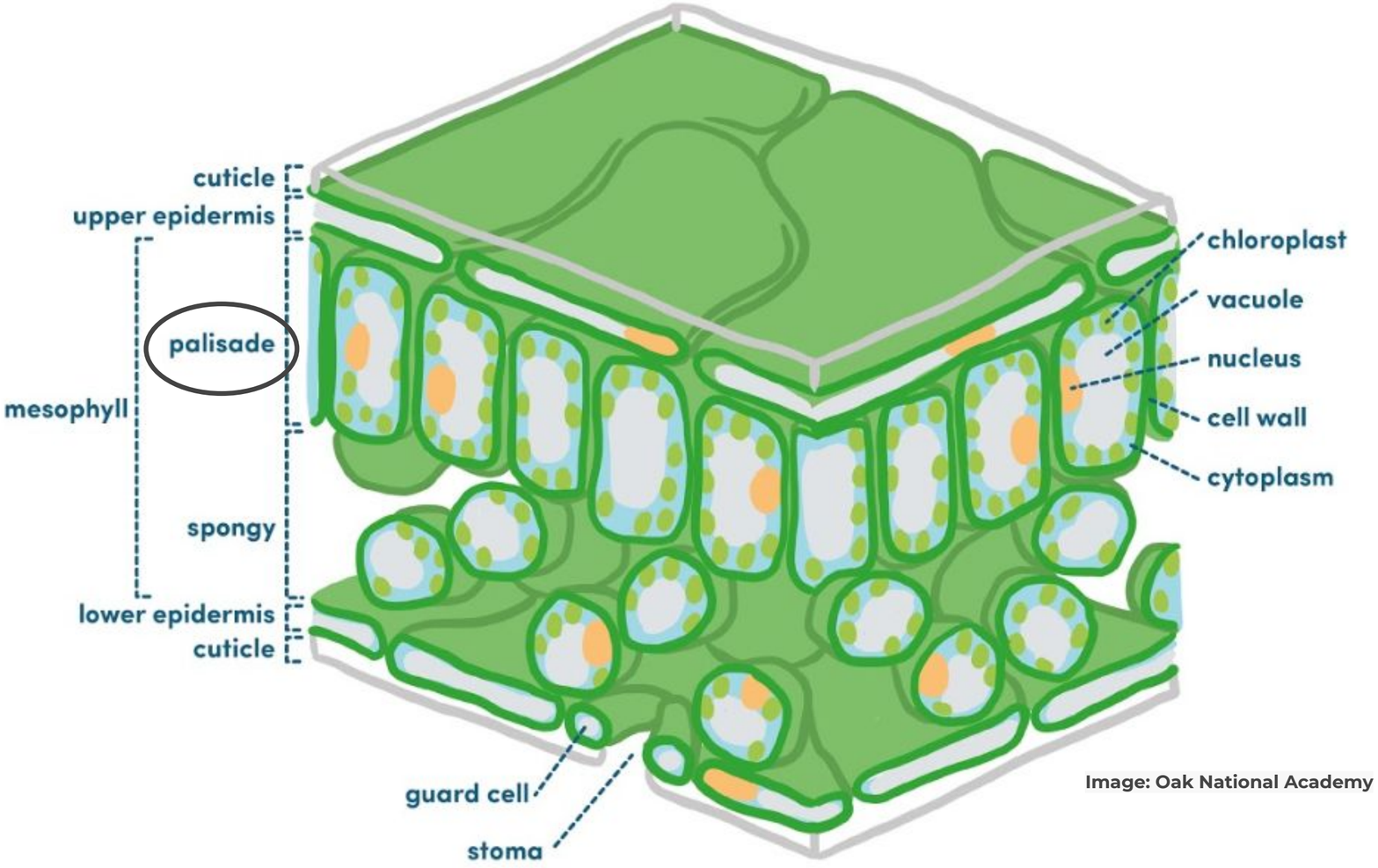


Image: Oak National Academy

The cell is **packed with chloroplasts** so that it can absorb more energy from the sun for photosynthesis.

Phloem and xylem cells

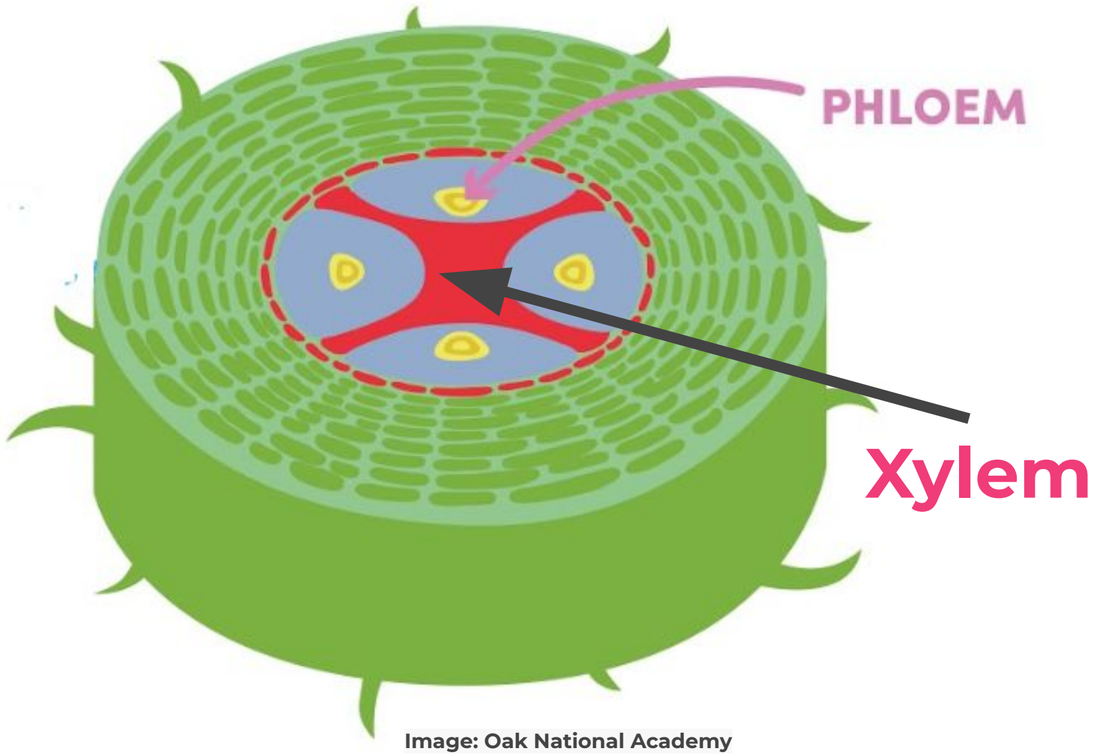


Image: Oak National Academy

The phloem cells have **no nucleus and it has a large vacuole** for the easy transfer of sugars up and down the plant.

Xylem cells are dead cells. They are strengthened by **lignin**.
These are hollow tubes for the transport of water.

Multiple choice quiz

What is the cell being shown in the diagram?

Palisade cell

Phloem cell

Xylem cell

Root hair cell

Multiple choice quiz

Which of the following is a type of dead specialised cell?

Palisade cell

Phloem cell

Xylem cell

Root hair cell

Multiple choice quiz

Which two of the following are cells without a nucleus?

Red blood cell

Phloem cell

Xylem cell

Root hair cell

Multiple choice quiz

Which of the following has a large surface area for absorption of substances?

Palisade cell

Phloem cell

Xylem cell

Root hair cell

Multiple choice quiz

Which two of the following contains more mitochondria than other cells?

The sperm

Nerve cell

The egg

Muscle cell

Multiple choice quiz

Which of the following carry oxygen around the body?

The sperm

Nerve cell

Red blood cell

Muscle cell

Independent practice

Independent practice

1. Why does the nerve cell have lots of dendrites?
2. What is a specialised cell?
3. What is the function of the cell membrane?
4. What does differentiate mean?
5. What is the function of the nucleus?
6. The sperm cell has a tail because……
7. What is the function of a nerve cell?
8. Why do nerve cells contain lots of mitochondria?
9. What is the adaptation of the root hair cell?
10. What are palisade cells specailised for?

Answers to independent practice

1. Lots of dendrites allows it to make many connections to other cells.
2. A cell that has special features to perform a certain function.
3. To control the movement of substances in and out of the cell.
4. Adaptation of cells to perform a certain function.
5. It controls the cell and contain genetic material.
6. It needs to be able to move around easily and swim to the egg.
7. They carry nervous impulses around the body.
8. To release energy needed to make transmitter molecules.
9. The root hair cell has a finger-like structure that increases it surface area for water and mineral absorption.
10. Palisade cells are specialised for performing photosynthesis.