

# Y7 Biology: Cells Knowledge Organiser

## Key concept 1: cells are building blocks are all living things

- You can work out if something is alive by checking to see if it carries out all 7 of the life processes. The life processes (MRS NERG) are:

**Movement** – altering your position

**Reproduction** – producing offspring

**Sensitivity** – responding to changes in the environment e.g. to light or sound

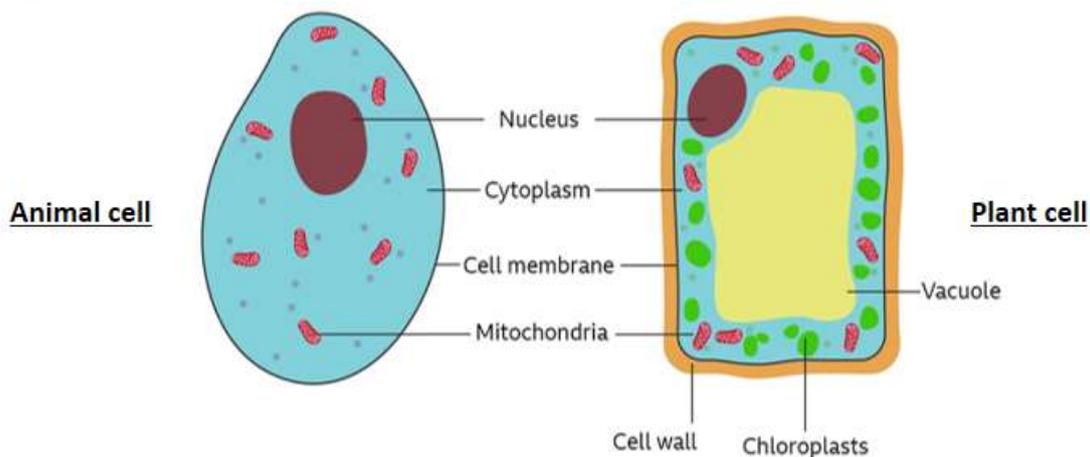
**Nutrition** – absorbing useful chemicals from food or from the soil/air

**Excretion** – getting rid of waste products

**Respiration** – releasing energy from food

**Growth** – increasing in size

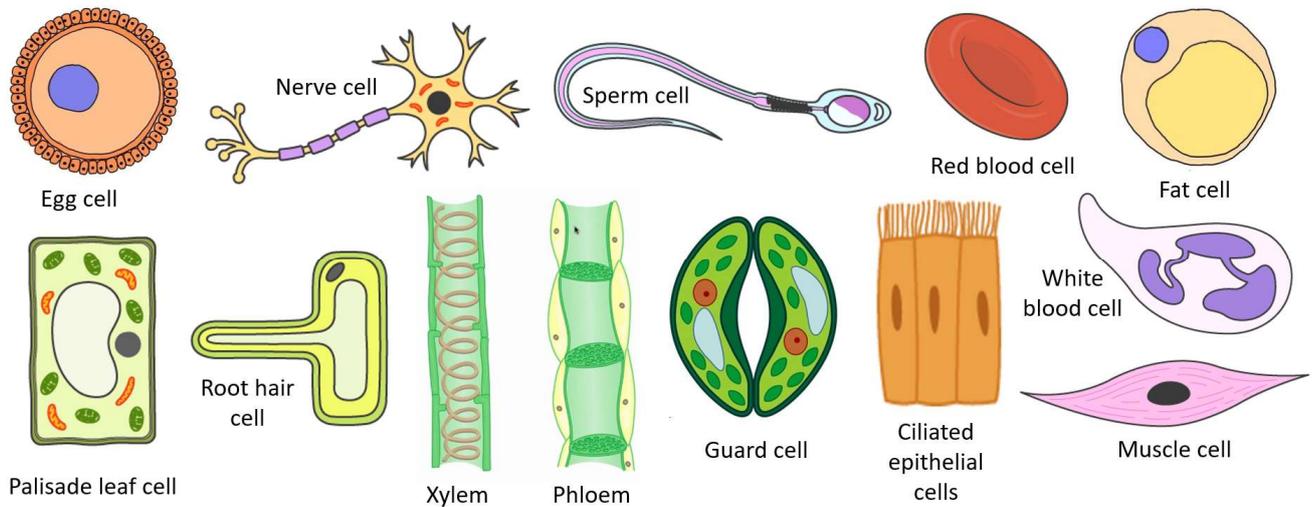
- All living things are made of simple building blocks called **cells**. Both plants and animals are **multicellular** (made of many cells). Some organisms, like bacteria (e.g. salmonella) and fungi (e.g. yeast), are **unicellular** (made from just one cell).
- Most cells are so small they can only be seen with a **microscope**. You can calculate the magnification (how much bigger you have made the specimen) by multiplying the eyepiece lens by the objective lens.
- The diagram shows the structure of an animal and plant cell:



- Each part of the cell carries out a particular function:
  - **Nucleus** – controls the cell's activities because it contains the *genome*. The genome is the entire genetic material of an organism and is made of DNA.
  - **Cytoplasm** – a jelly-like substance which makes up most of the cell and is where chemical reactions happen.
  - **Cell membrane** – surrounds the cytoplasm and controls the movement of substances into and out of the cell, substances often move by *diffusion*.
  - **Mitochondria** – this is where respiration (a chemical reaction which releases energy from food) takes place.
  - **Cell wall** – made from tough *cellulose*, it helps to give a plant cell its shape.
  - **Vacuole** – filled with cell sap which stores useful substances and keeps the cell rigid.
  - **Chloroplast** – where light is absorbed so the plant can make its own food by photosynthesis. Chloroplasts contain a green substance called *chlorophyll* which absorbs the light needed for photosynthesis.

## Key concept 2: Specialised cells have structural adaptations so they can carry out specific functions

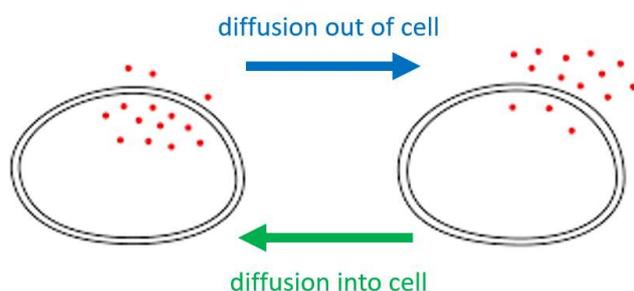
- Both plants and animals contain specialised cells which have **structural adaptations** (special features) to help them carry out their function.
- The diagram below shows some examples of specialised cells (\*not to scale):



- **Sperm cells** need to carry DNA to the egg cell. Their long tail for is for movement.
- **Eggs cells** have a large cytoplasm which contains lots of stored food to allow the embryo to begin growing.
- **Red blood cells** carry oxygen around the body. They have a large surface area to absorb more oxygen, a special chemical called haemoglobin to transport oxygen and they do not have a nucleus to give the cell room to carry more oxygen.
- **Muscle cells** contract (get shorter), they contain many mitochondria so they can carry out lots of respiration to release the energy needed to do this.
- **Ciliated epithelial cells** (cilia cells) have hair-like structures which waft to move mucus out of the lungs and to egg cells through the female reproductive system.
- **Palisade leaf cells** contain many chloroplasts so lots photosynthesis can happen.
- **Root hair cells** absorb water. They have a large surface area so they can absorb lots of water. Since they are underground, they do not contain chloroplasts.

## Key concept 3: molecules move into and out of cells by diffusion

- If particles of a substance are in a higher concentration, they will move from this region to where they are in a lower concentration. This is called **diffusion**.
- It is important to remember that the particles: will move in both directions, but there will be a *net* (overall) movement from high to low concentration and that they will end up evenly spread throughout the liquid or gas, but will continue to move.
- Substance can enter and leave the cell by diffusing across the cell membrane.



- **Oxygen and glucose** will diffuse **into the cell** as they are needed for respiration.
- **Carbon dioxide and any other waste** products will diffuse **out of the cell** so they can be excreted.

- Substances can also move within the cell by diffusing across the cytoplasm.

## Cells: Key Word Glossary

No	Key word	Definition
1	Cell	The basic building block of a living organism, contains parts to carry out life processes.
2	Unicellular	Living things made up of one cell (organisms made of many cells are multicellular)
3	Nucleus	Contains the genome (DNA) and <b>controls the cell's activities.</b>
4	Cell membrane	Surrounds the cell and <b>controls movement of substances in and out.</b>
5	Cytoplasm	Jelly-like substance in the cell where <b>chemical reactions happen.</b>
6	Mitochondria	Part of the cell where energy is released from food molecules through <b>respiration.</b>
7	Cell wall	Strengthens the cell and gives it its shape. In plant cells it is made of cellulose.
8	Chloroplasts	Absorbs light energy so the plant can make food by photosynthesis.
9	Vacuole	Area in a cell that contains liquid and can be used by plants to keep the cell rigid and <b>store substances.</b>
10	Diffusion	The net movement of particles from a high to a low concentration.

## Cells: Key Facts

No	Questions	Answers
1	How is magnification calculated?	Eyepiece lens x objective lens
2	Which specialised cell does not have a nucleus to give it more room for carrying oxygen?	Red blood cell
3	Which specialised cell contains lots of mitochondria for energy?	Muscle cell
4	Which specialised cell has hair like structures which move mucus and egg cells?	Ciliated epithelial cells
5	Which specialised cell has a large surface area to absorb water?	Root hair cell
6	Which specialised cell contains many chloroplasts?	Palisade leaf cell
7	Which specialised cell has a tail for swimming?	Sperm cell
8	Which specialised cell has a large food store to allow the embryo to begin growing?	Egg cell
9	Name a substance which will diffuse into a cell.	Oxygen, glucose or water
10	Name a substance which will diffuse out of a cell.	Waste products e.g. carbon dioxide or urea