

# Cells –Tissue – Organ – Organ system

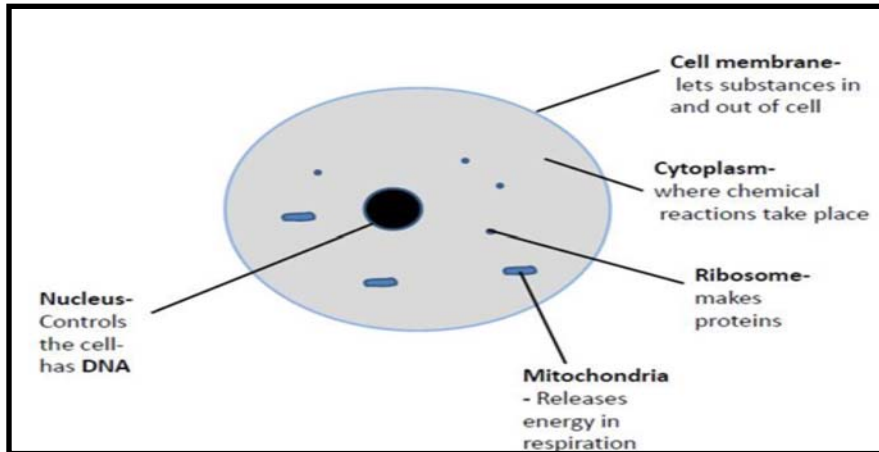
Living things have certain life processes in common. There are seven things that all living things do. The phrase **MRS GREN** is a way to remember them:

|   |                     |                                            |
|---|---------------------|--------------------------------------------|
| M | <b>Movement</b>     | All living things move, even plants        |
| R | <b>Respiration</b>  | Getting energy from food                   |
| S | <b>Sensitivity</b>  | Detecting changes in the surroundings      |
| G | <b>Growth</b>       | All living things grow                     |
| R | <b>Reproduction</b> | Making more living things of the same type |
| E | <b>Excretion</b>    | Getting rid of waste                       |
| N | <b>Nutrition</b>    | Taking in and using food                   |

Living things are called **organisms**. Organisms are made of tiny subunits called **cells** (boxes). **A cell is the basic building block of all living things.**

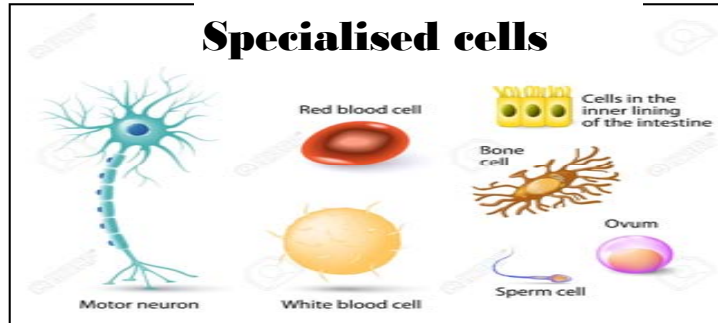
**Eukaryotic cells** (eu= true, Karyon= nucleus), so these **have a nucleus** (DNA surrounded by a membrane). Plants, animals and fungi are in this group.

All the components of a cell are called **organelles** (like small organs).



Simple organisms may be **unicellular**(consist of one cell)

Complex organisms are **multicellular**(consist of many cells)



## Animal cells have:

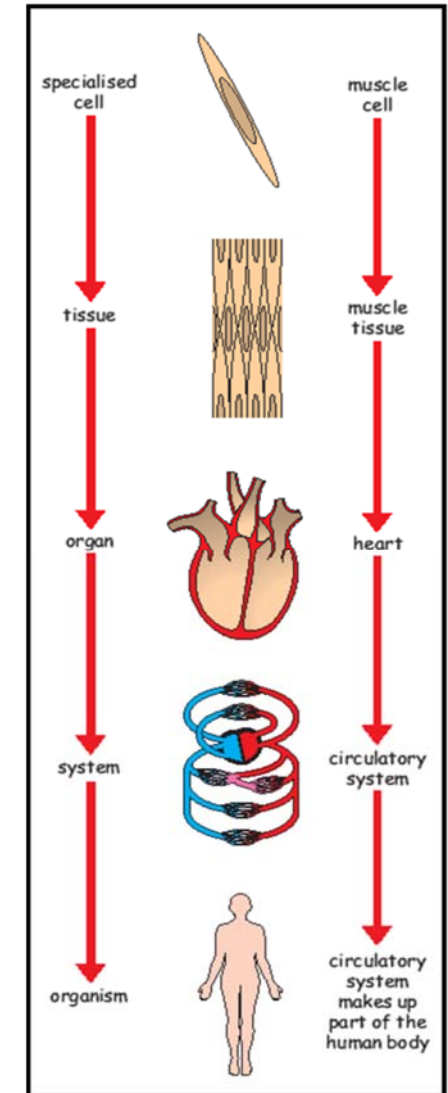
**Cell membrane**- outer flexible surrounding, **controls entry and exit of substances** into the cell.

**Cytoplasm**- Jellylike fluid **where chemical reactions take place**

**Nucleus**- **Controls the activities of the cell**, contains genetic material (DNA)- Do not say its the brain of the cell

**Mitochondria**- Oval organelles surrounded by 2 membranes, **site of respiration**- release (don't produce) energy from glucose.

**Ribosomes**- very tiny organelles which



## Tissues

Animal cells and plant cells can form tissues, like muscle tissue. A living tissue is made from a group of cells with a similar structure and function, which all work together to do a particular job. Here are some examples of tissues: Muscle, the lining of the intestine, the lining of the lungs

## Organs

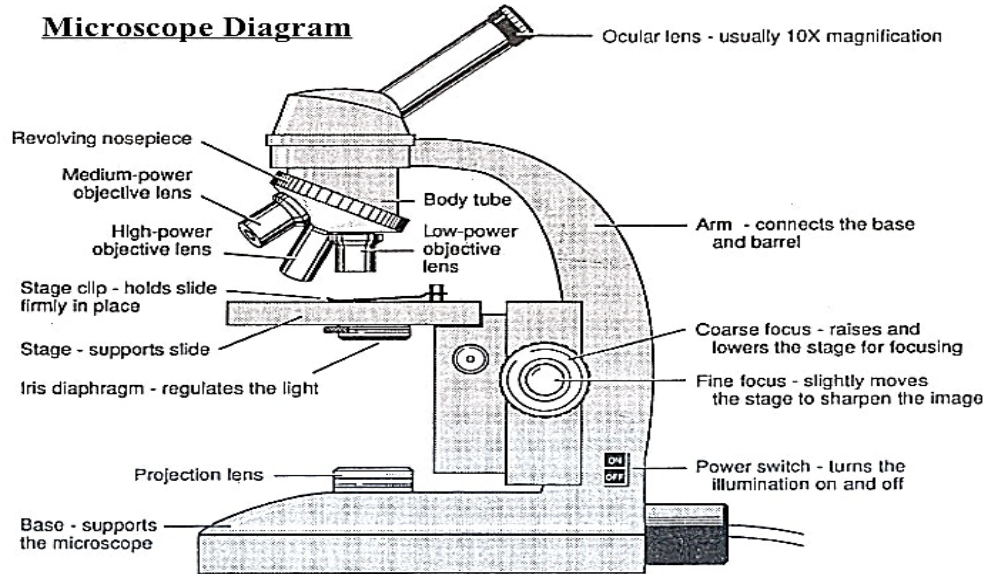
An organ is made from a group of different tissues, which all work together to do a particular job. Here are some examples of organs: Heart, lung, stomach, brain

## Organ systems

An organ system is made from a group of different organs, which all work together to do a particular job. Here are some examples of organ systems: circulatory system, respiratory system, digestive sys-

### 3. Light/Compound Microscopes

**Microscope Diagram**



**Cells are very small (usually between 1 and 100  $\mu\text{m}$ ) and can only be seen by magnification with a microscope.**

**Magnification** is how large the image is compared to real life .

**Resolution** is used to describe the ability of **microscope** to distinguish detail. In other words, this is the minimum distance at which two distinct

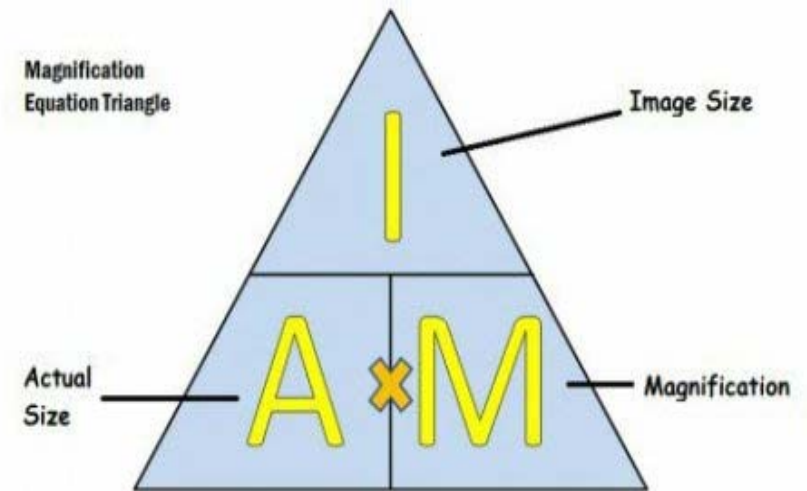
**Magnification** can be worked out from a photograph or drawing using the equation below:

$$\text{Image} = \text{Actual size} \times \text{Magnification}$$

The same unit of measurement should be used when making the calculation - metre (m), millimetre (mm) or micrometre ( $\mu\text{m}$ ). To convert millimetres into micrometres, multiply by **1000**.

The above equation can be rearranged in order to calculate the actual length of the cell and the magnification used as well as the length of the image.

**Magnification Equation Triangle**



### Light vs. Electron microscopes

| Feature                 | Light microscope | Electron microscope      |
|-------------------------|------------------|--------------------------|
| Radiation used          | Light rays       | Electron beams           |
| Magnification           | x 2000           | x 500 000                |
| Resolving power         | 200 nm           | 0.2nm                    |
| Focused by              | Glass lenses     | Electromagnets           |
| Biological material     | Living or dead   | Dead                     |
| Size                    | Small & portable | Very large & static      |
| Preparation of material | Quick & simple   | Time-consuming & complex |
| Cost                    | Relatively cheap | VERY expensive           |

