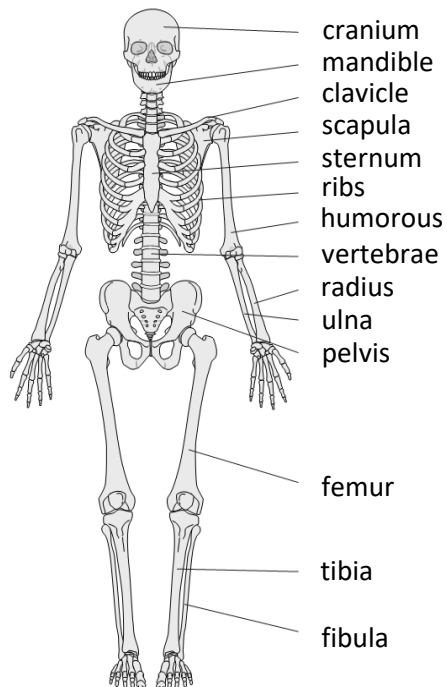


1) The Skeletal System

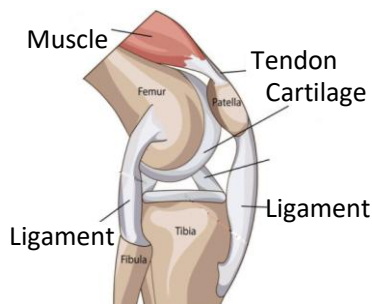
Functions of the skeleton:

- To **support** the body
- To **protect** vital organs
- To help the body **move**
- To make **blood cells**



2) Joints

- Joints are where bones join together
- Ligaments** hold bones together in a joint.
- Tendons** attach muscle to bones.
- Cartilage** covers the end of bones and is smooth to stop bones rubbing together.

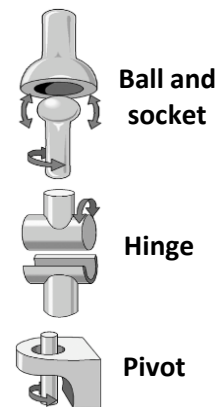


3) Types of Joints

- Some joints are **fixed** and can't move, e.g. bones of the cranium (skull) fuse together.
- Most joints are **synovial** and are freely movable.

Synovial Joints

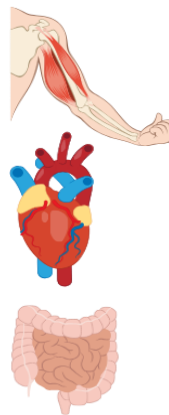
Type of Synovial Joint	Examples in Body	Movement
Ball and Socket	Shoulder, Hip	All directions
Hinge	Elbow, Knee, Ankle	One direction
Pivot	Neck	Rotational



4) Muscles

Three types of muscle:

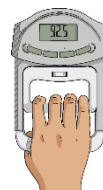
- Skeletal** muscle – attached to bones and contracts voluntary to make the body move
- Cardiac** muscle – found in the heart and contracts involuntary to pump blood
- Smooth** muscle – found inside organs and contracts involuntary to move substances through the organ



5) Strength of Muscles

Different muscles have different strengths. The strength can be measured by how much **force** the muscle exerts. Force is measured in **Newtons (N)**.

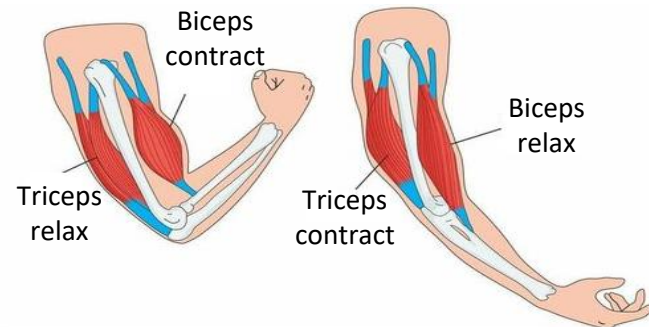
Force can be measured using a **dynamometer** or pushing on a set of scales.



6) Antagonistic Pairs of Muscles

- Muscles can only pull and cannot push so muscles have to work in pairs called antagonistic muscles.
- One muscle in the pair **contracts** whilst the other **relaxes**.

E.g. the bicep and triceps working to bend the elbow.



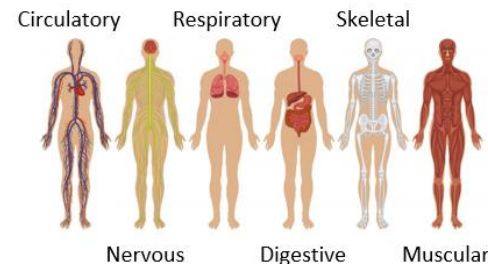
7) Investigation Keywords

- Independent variable – what you change
- Dependent variable – what you measure
- Control variables – what you keep the same

8) Organisation of Organisms

- Organism** – a group of organ systems working together
- Organ system** – a group of organs working together
- Organ** – a group of different tissues working together
- Tissue** – a group of the same type of cell working together
- Cell** – the basic building block of all organisms

There are lots of organ systems in humans, some examples are:



1) Characteristics of Living Things

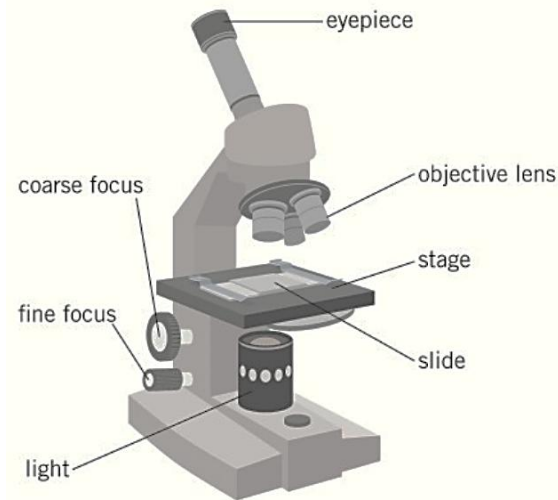
All living organisms can do the following:

- **Movement** - all living things move, even plants
- **Respiration** - getting energy from food
- **Sensitivity** - detecting changes in the surroundings
- **Growth** - all living things grow
- **Reproduction** - making more living things of the same type
- **Excretion** - getting rid of waste
- **Nutrition** - taking in and using food

2) Microscopes

All organisms are made up of **cells**. Cells are so small, you need a **light microscope** to see them.

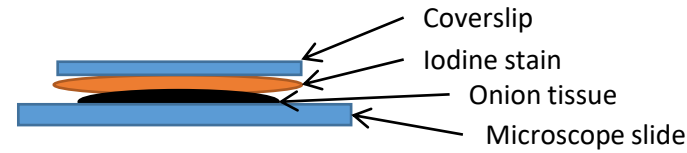
Light microscopes produce a magnified image of an object.



- The **lowest powered objective lens** should be used first to give a **large field of view**.
- The **coarse focus** is used to bring the object into view.
- The **fine focus** is used to add more detail and remove blurriness.

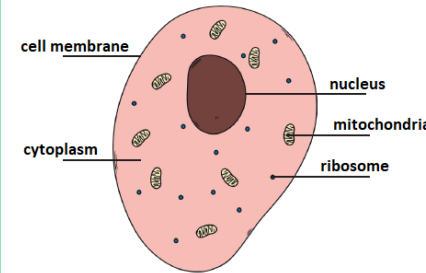
Total magnification = eyepiece lens × objective lens

3) Making Microscope Slides



Stains are used to add contrast to cells. Certain stains are used to stain specific cell structures. E.g. onion cells use **iodine stain** and cheek cells use **methylene blue**.

4) Animal Cell Organelles



Nucleus: carries genetic information and controls the cell.

Cell membrane: controls the movement of substances in and out of the cell

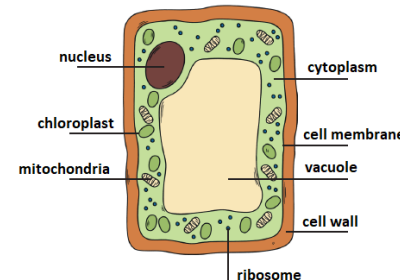
Cytoplasm: where chemical reactions take place

Mitochondria: where respiration takes place (energy)

Ribosome: where proteins are made

5) Plant Cell Organelles

Plant cells contain the same 5 organelles as an animal cell as well as:



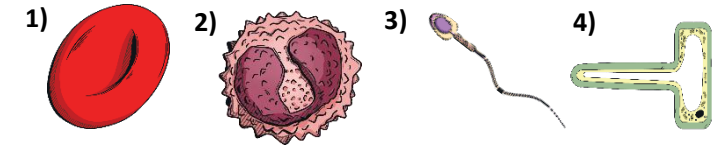
Cell Wall: made of cellulose, provides support

Vacuole: contains cell sap, which keeps the cell firm

Chloroplasts: where photosynthesis takes place

6) Specialised Cells

Specialised cells are ones with special features (adaptations) to help carry out their function (job).



1) Red blood cell: transports oxygen around the body, biconcave shape increases surface area, no nucleus

2) White blood cell: fights microorganisms which cause disease, can change shape, produces antibodies

3) Sperm cell: travel to and fuse with an egg cell, long tail for movement, lots of mitochondria to release energy for moving

4) Root hair cell: absorbs water from the soil in plants, has a large surface area

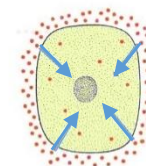
7) Multicellular and Unicellular

- **Multicellular** organisms are those made up of **more than one cell**.
- Examples of multicellular organisms include animals and plants.
- **Unicellular** organisms are those made from **only one cell**.
- Examples of unicellular organisms are bacteria and Euglena

8) Movement of Substances in Cells

Diffusion is the movement of particles from higher to lower concentrations. Substances like **oxygen**, **carbon dioxide** and **glucose** move in and out of cells by diffusion.

More oxygen outside the cell



Oxygen diffuses into the cell