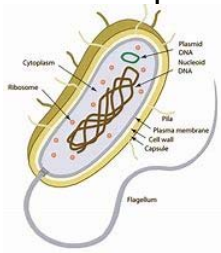
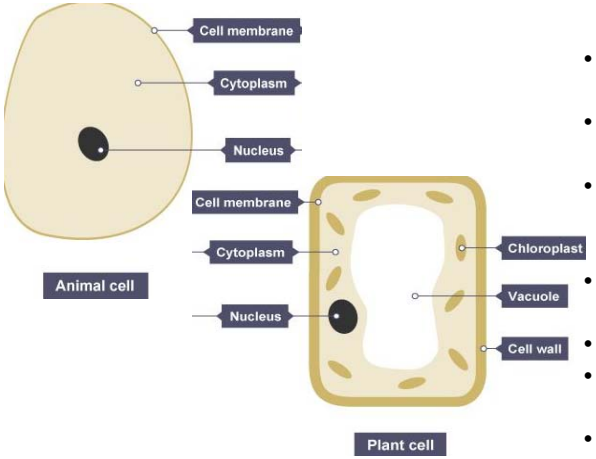
B1 Knowledge Organiser – 4.1.1/4.1.2 - Cell Biology

Prokaryotic cells 1

- Bacterial cells
- Have cytoplasm, cell membrane and cell wall
- Do not have a nucleus
- DNA found as a loop - plasmid



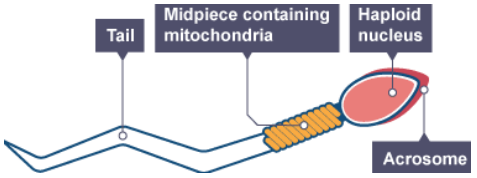
Eukaryotic cells 2



- **Nucleus**: contains genetic information. Controls the activities of the cell.
- **Cell membrane:** Controls what goes in/out of the cell.
- **Cytoplasm:** where chemical reactions happen.
- **Chloroplasts:** absorbs light energy so the plant can make food.
- **Permanent Vacuole:** contains liquid to keep the cell rigid.
- **Cell wall:** strengthens the cell.
- **Mitochondria** – Releases energy from respiration
- **Ribosome** – Makes protein

Cell specialisation 3

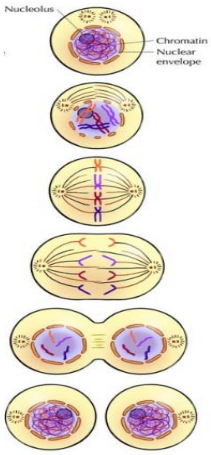
- Specialised cells have a particular function
- Identify the **adaptation** and **explain** how it allows the cell to perform its function
- **Sperm cell:** Tail – swim to egg, Lots of mitochondria – requires lots of energy



Cell division – Mitosis – (Growth and repair) 4

Chromosomes are made of DNA and carry a large number of genes. Found in pairs. **23 pairs** in each human cell. **The cell cycle:**

1. Cell **grows** to increase the number of sub-cellular structures, e.g. mitochondria and ribosomes
2. DNA **replicates**
3. Chromosomes line up on the equator
4. Spindle fibres **pull chromosomes apart** so one copy is at each end of the cell
5. **Nucleus divides**
6. Cytoplasm and cell membrane divides to form **two identical cells**



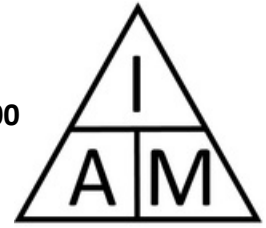
Microscopy – Required Practical 5

Maths skills:

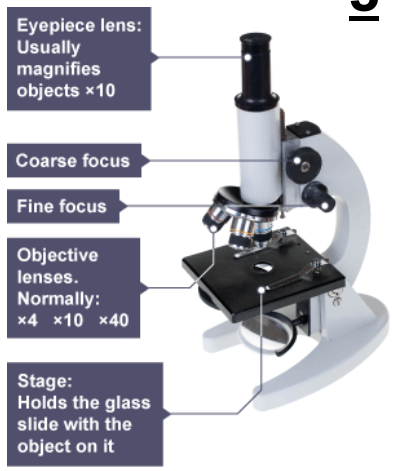
1,000 µm = 1mm

µm → mm divide by 1000

- Increasing magnification makes an image bigger
- Does not "zoom in"



Remember:
A = Actual size
I = Image size
M = Magnification



Stem cells 6

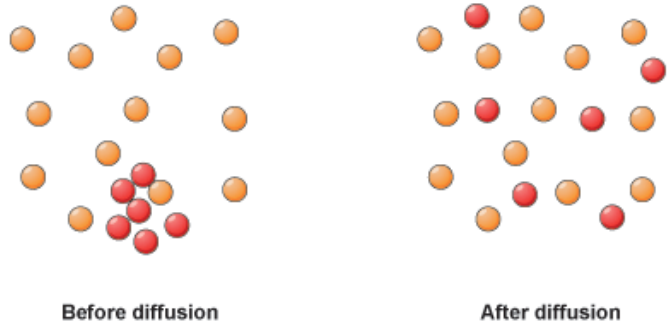
- Stem cells are **undifferentiated cells** which are capable of **differentiating into many types of cell**
- Stem cells from **human embryos** can be cloned and made to differentiate into different types of human cell
- Stem cells from **adult bone marrow** can form blood cells
- Treatment from stem cells may help **paralysis and diabetes**
- **Meristem tissue** in plants can differentiate into any type of plant cell

Stem cell applications 7

- An embryo is produced with the **same genes as the patient**
- Stem cells from the embryo are **not rejected** by the patient's body so may be used for medical treatment
- **Risk of viral infection**
- Stem cells from meristems in plants can be used to produce clones of plants quickly and economically
- Rare plants can be **cloned to protect from extinction**
- Crop plants with **resistance to disease can be produced in large numbers**

B1 Knowledge Organiser – 4.1.3 – Transport in cells

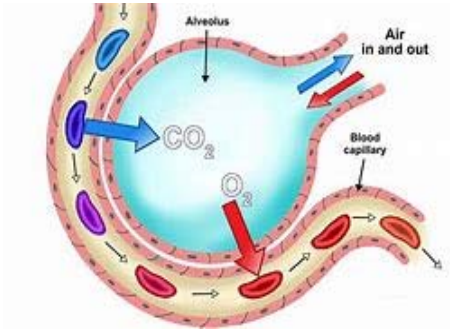
Diffusion 1



- Transport of substances **down a concentration gradient**
- Gases
- Liquids – except water
- **High to Low concentration**
- **Passive process** – No energy required

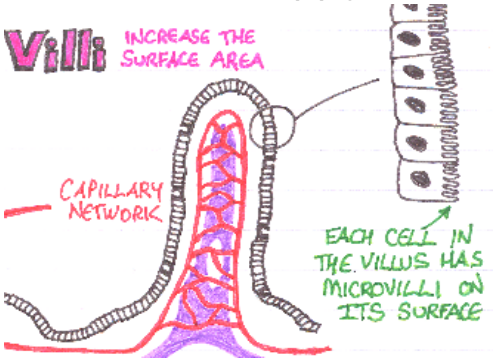
Diffusion - Contexts 2

- Gas exchange
- Digestion
- Respiration



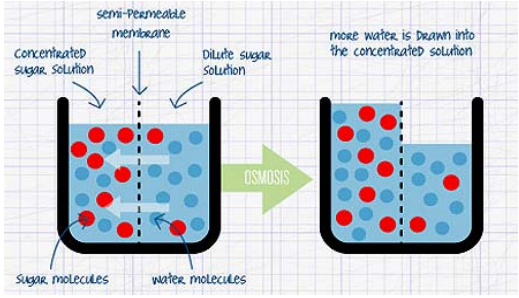
Diffusion - Adaptations 3

- E.g. alveoli/microvilli
- Large surface area
- Short diffusion pathway
- Good blood supply



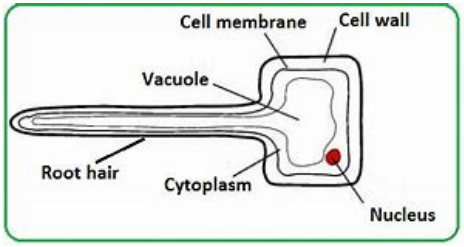
Osmosis 4

- Movement of water molecules from a more dilute to concentrated solution



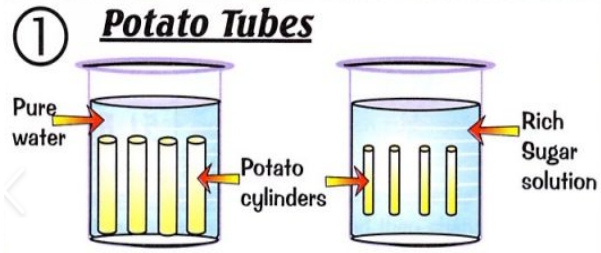
Osmosis - Adaptations 5

- **Root hair cell:** large surface area, absorbs more water



Osmosis – Required practical 6

- **Independent variable** – Concentration of sugar solution
- **Dependent variable** – Change in mass of potato
- **Control variables** – Volume of sugar solution, time in sugar solution

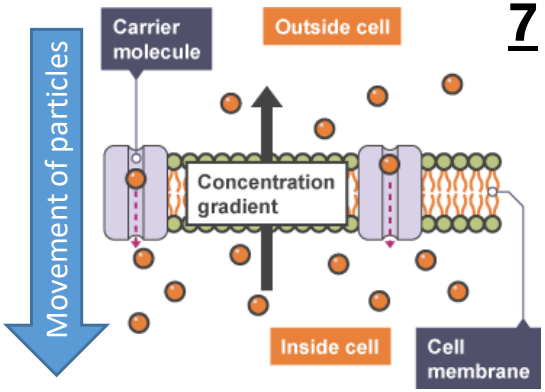


In *Pure Water* the potato tubes *swell* because water *enters their cells* by *osmosis*.

In *Rich Sugar Solution* the potato tubes *shrink* because water *leaves their cells* due to *osmosis*.

Active transport 7

- Transport of substances against a concentration gradient
- **Low to High concentration**
- **Requires energy** released from respiration



Contexts 8