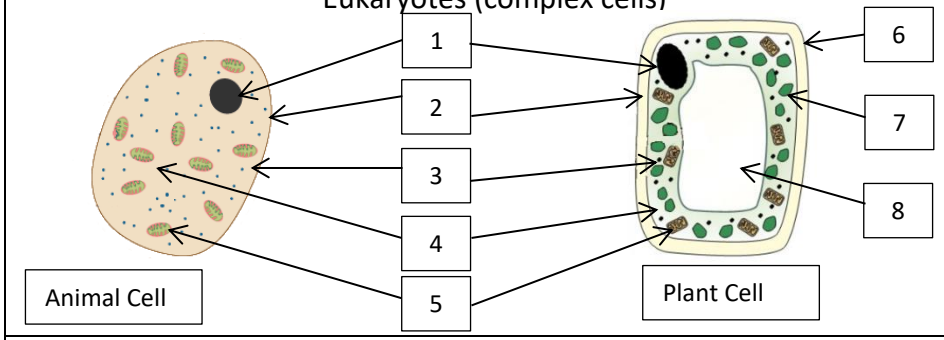
ATHERTON HIGH SCHOOL

Science: Cell Biology

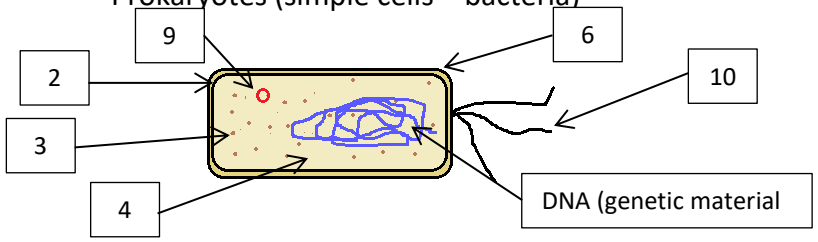
1. Key Words

	Organelle	Function
1	Nucleus	Controls the cell Contains genetic material
2	Cell membrane	Controls the exchange of substances in and out of the cell
3	Ribosomes	Protein synthesis
4	Cytoplasm	Where chemical reactions occur
5	Mitochondria	Releases energy from aerobic respiration
6	Cell wall	Supports the cell
7	Chloroplasts	Where photosynthesis occurs
8	Vacuole	Contains cell sap
9	Plasmid	Circular ring of DNA
10	flagella	Provides movement for single celled organisms

Eukaryotes (complex cells)



Prokaryotes (simple cells – bacteria)



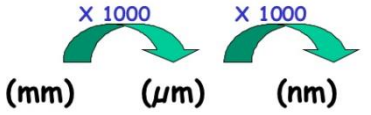
2. Specialised Cells

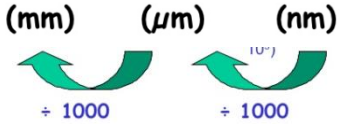
Cell	Function	Adaptation
Sperm cell	Fertilised the egg cell	• Tail to swim to egg • Many mitochondria to release energy
Nerve cell	Carry electrical impulses around the body	• Long to reduce the number of synapses • Lots of branches to connect to many cells
Muscle cell	Contracts and relaxes to cause movement	• Many mitochondria to release energy • Contains protein fibres that can contract
Root hair cell	Absorbs water and minerals from the soil	• Large surface area to increase absorption • No chloroplasts to allow a larger vacuole
Palisade cell	Where most photosynthesis occurs	• Many chloroplasts, so more photosynthesis • Rectangular shape to fit more cells along the upper surface of the leaf
Phloem cell	Transports sugars, ions and other minerals around the plant	• Many mitochondria to release energy for active transport • Perforated ends so cytoplasm of adjacent cells connect speeding up exchange
Xylem cell	Transports water from the root to the leaves.	• Contains lignin to prevent water loss • Hollow so water and minerals can travel through

3. Comparing microscopes

Type	Advantages	Disadvantages
Light Microscope	• Can see colours • Cheaper • Can see live specimens	• Lower magnification • Lower resolution
Electron Microscope	• Higher resolution • Higher magnification	• Cannot see colour • Only see dead specimens

Conversions:





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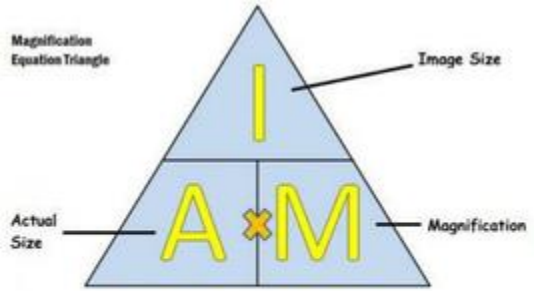
4. Calculating magnification



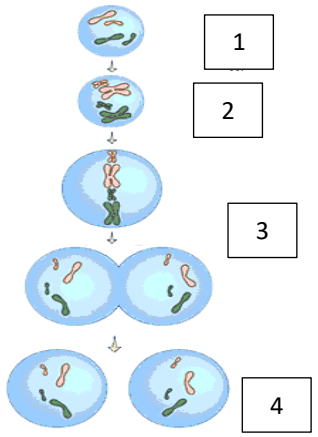
1. Magnification = image size ÷ actual size.
2. Actual size = image size ÷ magnification.
3. Image size = actual size x magnification.

5. Cell differentiation and stem cells

Differentiation	When a stem cell changes into a specialised cell
Stem cells	Cells that have not differentiated yet
Adult stem cells	Stem cells found in body tissues such as skin and bone marrow
Embryonic stem cells	Stem cells from the embryo that have the potential to turn in to any type of specialised cells
Meristems	Tips of the roots and shoot where the plant stem cells are found
Chromosomes	Condensed strand of DNA containing the genes for characteristics (23 pairs in humans)
Cell cycle	The process where the cell divides
Mitosis	A type of cell division that produced 2 identical diploid daughter cells
Therapeutic cloning	Creating a cloned embryo to have the same genetics as the patient to treat genetic diseases.

6. Stages of the cell cycle (mitosis in lilac)

1	Organelles are copied and DNA condenses into chromosomes
2	Chromosome number doubles and nuclear membrane dissolves
3	Chromosomes line up along the centre and duplicate chromosomes are pulled apart
4	Cell membrane closes around each set of chromosomes (cytokinesis) and 2 identical cells are formed



7. Types of exchange

Key Word	Definition	Example
Diffusion	Movement of solutes from a high to a low concentration across a semi-permeable membrane	Oxygen and carbon dioxide exchanged in the lungs
Osmosis	Movement of water from a low to high concentration across a semi-permeable membrane	Water moving into the blood in the large intestine or into the roots of a plant
Active transport	Movement of solutes from a low to a high concentration against a concentration, requiring energy	Minerals moving into the root hair cells and sugars moving in to the blood in the small intestines