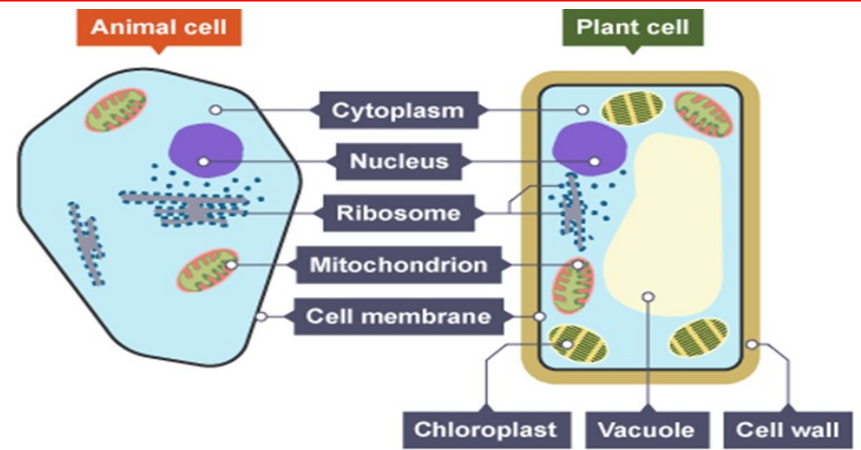


B1 : Cell Biology

Section 1: Cell Structure

Cell Structure	Function	Eukaryotic		Prokaryotic
		Animal Cells	Plant Cells	Bacterial Cells
1 Nucleus	Contains genetic information that controls the functions of the cell.	Y	Y	
2 Cell membrane	Controls what enters and leaves the cell.	Y	Y	Y
3 Cytoplasm	Where many cell activities and chemical reactions within the cell occur.	Y	Y	Y
4 Mitochondria	Provides energy from aerobic respiration .	Y	Y	
5 Ribosome	Synthesises (makes) proteins .	Y	Y	Y
6 Chloroplast	Where photosynthesis occurs.		Y	
7 Permanent vacuole	Used to store water and other chemicals as cell sap .		Y	
8 Cell wall	Strengthens and supports the cell. (Made of cellulose in plants.)		Y	Y
9 DNA loop	A loop of DNA , not enclosed within a nucleus.			Y
10 Plasmid	A small circle of DNA , may contain genes associated with antibiotic resistance.			Y



Section 2: Specialised Cells

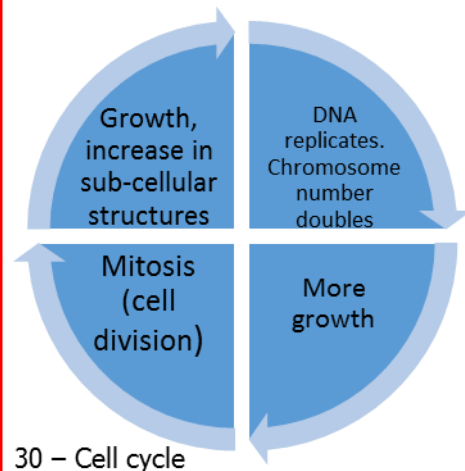
Specialised Cell	How structure relates to function
13 Sperm cell	Acrosome contains enzyme to break into egg; tail to swim; many mitochondria to provide energy to swim.
14 Nerve cell	Long to transmit electrical impulses over a distance.
15 Muscle cell	Contain protein fibres that can contract when energy is available, making the cells shorter.
16 Root hair cell	Long extension to increase surface area for water and mineral uptake; thin cell wall .
17 Xylem cell	Waterproofed cell wall; cells are hollow to allow water to move through.
18 Phloem cell	Some cells have lots of mitochondria for active transport ; some cells have very little cytoplasm for sugars to move through easily.

Section 3: Microscopy

22 Magnification	The degree by which an object is enlarged . Magnification = $\frac{\text{size of image}}{\text{size of real object}}$
23 Resolution	The ability of a microscope to distinguish detail .
24 Light microscope	Basic microscope with a maximum magnification of 1500x. Low resolution .
25 Electron microscope	Microscope with a much higher magnification (up to 500 000x) and resolving power than a light microscope. This means that it can be used to study cells in much finer detail.

Section 4: Orders of Magnitude

Unit Prefix	Size in metres	Standard Form
26 Centimetre (cm)	0.01m	10^{-2}m
27 Millimetre (mm)	0.001m	10^{-3}m
28 Micrometre (μm)	0.000001m	10^{-6}m
29 Nanometre (nm)	0.000000001m	10^{-9}m



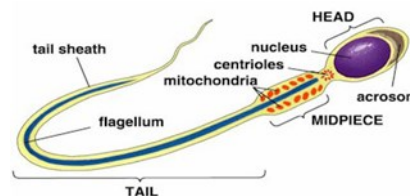
Section 5: Mitosis and the Cell Cycle	
31	Number of sub-cellular structures (e.g. ribosomes and mitochondria) increase .
32	Number of chromosomes double .
33	One set of chromosomes is pulled to each end of the cell.
34	The nucleus divides .
35	Cytoplasm and cell membranes divide to form two identical cells

Section 6: Stem Cells

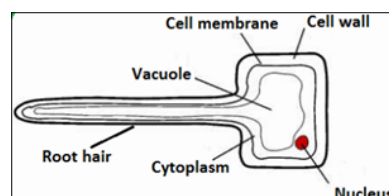
Stem Cell	Properties	Uses
36 Embryonic stem cell	Can divide into most types of cell.	Therapeutic cloning – embryonic stem cells produced with same genes as patient. No rejection .
37 Adult stem cell	Can divide into a limited number of cells e.g. bone marrow stem cells can form various blood cells.	
38 Meristem	Found in plants. Can differentiate (divide) into any type of plant cell.	Clone rare species to prevent extinction . Crops with special features can be clones

Pros and Cons of Using Stem Cells

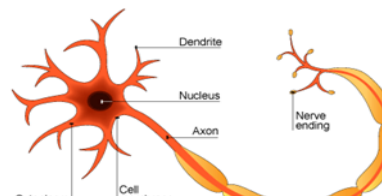
39 Pros	Treatment of diseases such as diabetes, dementia and paralysis.
40 Cons	Ethical and religious objections. Can transfer viruses held within cells.



19 – Sperm cell



21 – Root hair cell



20 – Nerve cell

Section 7: Transport Across Membranes

Cell Structure	Definition	Uses
41 Diffusion	Spreading out of the particles (gas/ solution) resulting in a net movement from an area of higher concentration to an area of lower concentration .	Oxygen and carbon dioxide in gas exchange (leaves and alveoli). Urea from cells into the blood plasma for excretion in the kidney.
42 Osmosis	The diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.	Movement of water into and out of cells.
43 Active Transport	The movement of substances from a more dilute solution to a more concentrated solution (against a concentration gradient). Requires energy from respiration.	Absorption of mineral ions (low concentration) from soil into plant roots . Absorption of sugar molecules from lower concentrations in the gut into the blood which has a higher sugar concentration.

Section 8: Factors Affecting Diffusion

Factor	Explanation
44 Difference in concentrations (concentration gradient)	The greater the difference in concentrations, the faster the rate of diffusion.
45 Temperature	Particles move more quickly at higher temperatures, so rate of diffusion increases.
46 Surface area of membrane	The greater the surface area the quicker the rate of diffusion.

Section 9: Adaptations of Exchange Surfaces

47	Large surface area
48	Thin membrane to provide a short diffusion path
49	Ventilation (in animals for gas exchange – maintains a concentration gradient)
50	Efficient blood supply (in animals – maintains a concentration gradient)