

	BIOLOGY 4.1 CELL BIOLOGY	NEED TO KNOW	REVISION
4.1.1.2	<p>Animal and plant cells</p> <p>Most animal cells have a nucleus, cytoplasm, membrane, mitochondria and ribosomes.</p> <p>Plant and algal cells also have a cell wall and often have chloroplasts and a permanent vacuole.</p> <p>Functions of the organelles.</p>	<p>Label diagrams of animal and plant cells.</p> <p>Describe the function of the main organelles.</p> <p>Prepare slides of plant and animal cells and describe the procedure.</p> <p>Correctly use a microscope to observe cells under different magnifications.</p> <p>Describe the order of size of: cell, nucleus, chromosome and gene.</p>	
4.1.1.3 4.1.1.4	<p>Cell specialisation - Cells may be specialised to carry out a particular function.</p> <p>Cell differentiation - Cells differentiate to form different types of cells. Animal cells differentiate at an early stage, whereas many plant cells can differentiate throughout life.</p> <p>Differentiation is the generation of specialised cells which acquire different organelles to enable them to carry out specific functions.</p>	<p>Explain how specialised cells are adapted for their function.</p> <p>Explain the need for differentiation in a multicellular organism.</p> <p>Describe the differences between differentiation in plants and in animals.</p>	
4.1.2.3	<p>Stem cells</p> <p>Stem cells are unspecialised cells that can differentiate to form many different types of cells.</p> <p>Stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into different cells, eg nerve cells.</p> <p>Stem cells may be used to treat paralysis and diabetes in the future.</p> <p>In therapeutic cloning an embryo with the same genes as the patient is produced. Cells from this embryo will not be rejected by the patient.</p> <p>Risks eg transfer of viruses, associated with the use of stem cells in medicine.</p> <p>Stem cells from meristems in plants are used to produce clones quickly and cheaply.</p>	<p>Define the term 'stem cell'.</p> <p>Describe where stem cells can be found in animals and plants.</p> <p>Describe in simple terms how nerve cells genetically identical to a patient could be obtained.</p> <p>Describe how stem cells could be used to help treat some medical conditions.</p> <p>Evaluate risks and benefits, as well as the social and ethical issues concerning the use of stem cells from embryos in medical research and treatments.</p> <p>Stem cells in plants</p>	
4.1.1.1	<p>Plant and animal cells are eukaryotic cells which have a membrane, cytoplasm and a nucleus.</p> <p>Bacterial cells are prokaryotic cells. They are smaller than eukaryotic cells and have a cell wall, membrane and cytoplasm, but do not have a nucleus. Their genetic material is a single loop of DNA or several small rings of DNA called plasmids in the cytoplasm.</p> <p>Microscopy</p>	<p>Identify plant, animal and bacterial cells and classify them as eukaryotic or prokaryotic cells.</p> <p>Label diagrams of bacterial cells.</p> <p>Describe the differences between eukaryotic and prokaryotic cells in terms of structure and size.</p> <p>Describe the differences in magnification and resolution of light and electron microscopes.</p> <p>Explain how electron microscopy has increased understanding of organelles.</p>	

	<p>An electron microscope has a much higher magnification and resolution than a light microscope, so it can be used to study cells in much finer detail and show organelles.</p> <p>real size=(image size)/magnification</p>	<p>Calculate the magnification of a light microscope.</p> <p>Carry out calculations using the formula:</p> <p>real size=(image size)/magnification</p> <p>Rearrange the equation to calculate image size or magnification.</p> <p>Convert values for the units: cm, mm, μm and nm.</p>	
4.1.1.5	Required Practical 1 - Microscopy	Use a light microscope to observe, draw and label a selection of plant and animal cells. A scale magnification must be included.	
4.1.2.1	<p>Chromosomes</p> <p>Chromosomes are found in the nucleus. They are made of DNA. Each chromosome carries a large number of genes.</p> <p>In body cells chromosomes are found in pairs.</p>	Describe what a chromosome is and where chromosomes are found in the cell.	
4.1.2.2	<p>Mitosis and the cell cycle</p> <p>Mitosis occurs during growth or to produce replacement cells.</p> <p>During mitosis:</p> <ul style="list-style-type: none"> copies of the genetic material separate the cell then divides once to form two genetically identical cells. <p>Mitosis forms part of the cell cycle.</p>	<p>Describe simply how and why body cells divide by. Knowledge and understanding of the stages in mitosis are not required.</p> <p>Draw simple diagrams to describe mitosis.</p> <p>Draw a simple diagram to describe the cell cycle in terms of:</p> <ul style="list-style-type: none"> cell growth, when the number of organelles increases replication of chromosomes, so the genetic material is doubled separation of the chromosomes: division of the nucleus division of the cell to form two identical cells. 	
4.1.3.1	<p>Diffusion</p> <p>Substances can move into and out of cells across membranes by diffusion.</p> <p>Definition of diffusion and factors affecting rate.</p> <p>Oxygen, carbon dioxide and urea passes through cell membranes by diffusion.</p> <p>Single celled organisms have a bigger surface area to volume ratio than multicellular organisms, so transfer sufficient substances across their surface.</p> <p>Multicellular organisms require specialised organ systems to exchange sufficient substances.</p> <p>Factors affecting the effectiveness of an exchange surface.</p>	<p>Define the term 'diffusion'.</p> <p>Explain how temperature, concentration gradient and surface area affect the rate of diffusion.</p> <p>Give examples of substances that diffuse into and out of cells.</p> <p>Calculate and compare surface area: volume ratios.</p> <p>Explain how the small intestine and lungs in mammals, and roots and leaves in plants, are adapted for exchange of substances.</p> <p>Describe and explain how an exchange surface is made more effective.</p>	
4.1.3.2	<p>Osmosis</p> <p>Water may move across cell membranes by osmosis.</p>	<p>Define the term 'osmosis'.</p> <p>Apply knowledge of osmosis to unfamiliar situations and make predictions.</p>	

	<p>Osmosis is the movement of water from a dilute solution to a more concentrated solution through a partially permeable membrane</p>		
4.1.3.2	<p>Required practical 3: Investigate the effect of salt or sugar solutions on plant tissue.</p>	<p>Required practical 3: investigate the effect of salt or sugar solutions on plant tissue.</p> <ol style="list-style-type: none"> 1. Investigate the effect of different concentrations of salt solutions on plant tissue. 2. Calculate percentage change in mass. 3. Plot a graph of the results using negative and positive values and use it to determine the isotonic concentration. 4. Plan, carry out and present results and conclusions for the effect of salt or sugar solutions on plant tissue. Determine the concentration of solution inside the plant cells. 	
4.1.3.3	<p>Active transport</p> <p>Active transport involves the movement of a substance against a concentration gradient and requires energy from respiration.</p> <p>Mineral ions can be absorbed by active transport into plant root hairs from very dilute solutions in the soil.</p> <p>Sugar can be absorbed by active transport from the gut into the blood.</p>	<p>Define the term 'active transport'.</p> <p>Describe where active transport occurs in humans and plants and what is transported.</p> <p>Explain why active transport requires energy.</p> <p>Explain how active transport enables cells to absorb ions from very dilute solutions.</p> <p>Explain the relationship between active transport and oxygen supply and numbers of mitochondria in cells.</p>	