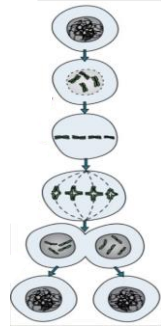


<b>Topic: Cells and Control</b>	<b>Duration: Combined 9 lessons</b>	<b>Composite: Unit test</b>
Key vocabulary:	<b>Core knowledge Components</b> <b>Powerful knowledge components crucial to commit to long term memory (IN RED BOX)</b>	Links to previous and future topics

Mitosis  
 Meiosis  
 Cell division  
 Haploid  
 Diploid  
 Gamete  
 Percentile  
 Multicellular  
 Stem cells  
 Specialised  
 Differentiation  
 Meristem  
 Receptor  
 Reflex arc  
 Neurone  
 Axon  
 Myelin sheath  
 Synapse  
 Neurotransmitter  
 Reflex

## CELLS AND CONTROL - Part 1

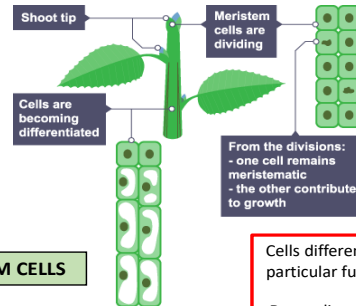


MITOSIS		
Stage 1	<b>Interphase (not part of mitosis)</b>	Before mitosis: Increase the number of sub-cellular structures e.g. ribosomes, mitochondria. DNA replication makes copies of chromosomes.
Stage 2	<b>Prophase</b>	Nucleus breaks down and spindle fibres appear.
Stage 3	<b>Metaphase</b>	Chromosomes are lined up on spindle fibres on the equator (middle) of the cell.
Stage 4	<b>Anaphase</b>	Chromosome copies are separated and pulled to opposite ends of the cell.
Stage 5	<b>Telophase</b>	A new nuclear membrane forms around each set of chromosomes.
Stage 6	<b>Cytokinesis</b>	Cell surface membrane forms to separate the cells

MITOSIS produces two **genetically identical** DIPLOID CELLS

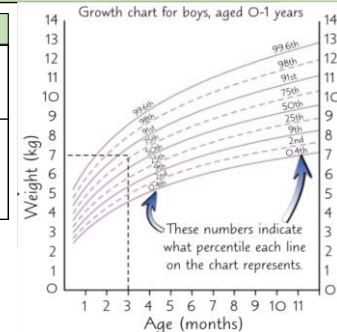
Multicellular organisms use mitosis to grow or replace cells that have been damaged. Some organisms use mitosis to reproduce and this is known as asexual reproduction (can reproduce without a partner). For instance, bacteria.

Cell division and growth	
<b>Growth in plants</b>	Cell division and differentiation, elongation (cells increase in length)
<b>Growth in animals</b>	Cell division by mitosis. Differentiation the process by which a cell changes to become specialised.



### STEM CELLS

**Meristems**  
 In plants, the only cells that divide by mitosis are found in plant tissues called meristems. Meristems tissue is found in the areas of a plant that are growing (the tips of the roots and shoots). Meristems produce unspecialised cells that are able to divide and form any cell type in the plant - they go on to make xylems and phloem which are specialised tissues.



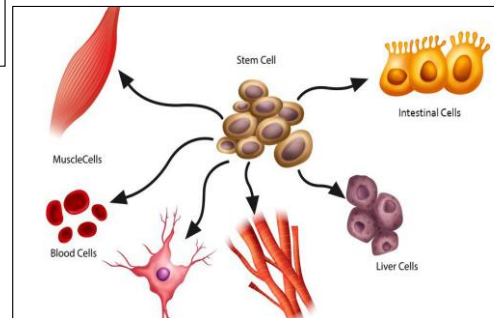
E.g. a three-month-old who weighs 7 kg is just above 75th percentile — roughly 75% of three-month-olds are lighter and 25% are heavier.

**Percentile charts can be used to monitor growth**

Cells differentiate to become specialised cells (cells with a particular function). Undifferentiated cells are called stem cells.

Depending on what instructions are given, stem cells can divide by mitosis to become new cells, which then differentiate.

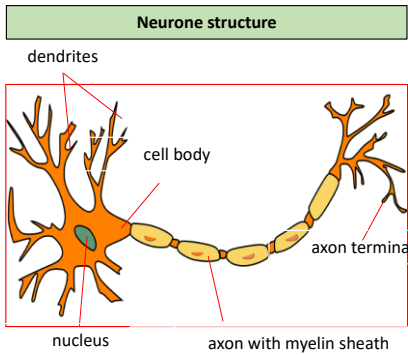
Stem cells are found in early human embryos and are able to differentiate into any type of cells. Adults have stem cells in their bone marrow and are able to differentiate into some types of cells such as blood and skin cells.



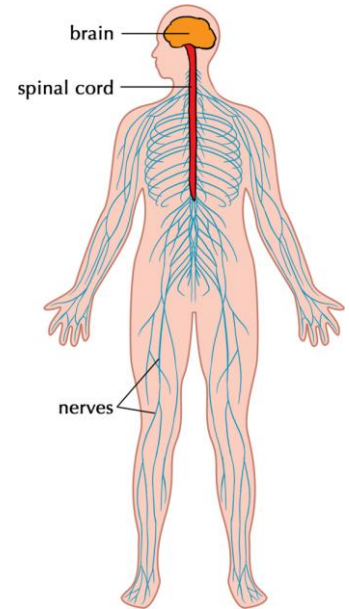
Benefits and risks of using stem cells
<b>BENEFITS</b>
Cure some diseases such as sickle cell anaemia – cured with a bone marrow transplant.
It may be possible to use embryonic stem cells to produce new cardiac muscle cells into someone with a heart disease.
<b>RISKS</b>
Tumour development – stem cells divide very quickly. If scientists are unable to control that rate at which the transplanted cells divide inside a patient, a tumour may develop.
Disease transmission – viruses live inside cells. If donor stem cells are infected with a virus and this is not picked up, the virus could be passed on to the patient.
Rejection – If the transplanted cells are not grown using the patients own stem cells, the patients body may recognise them as foreign and trigger an immune response to try and get rid of them. The patient can take antirejection drugs to suppress this response, but this make the patient susceptible to diseases.

KS3 – Cells, Moving and Breathing,  
 Microorganisms, plants

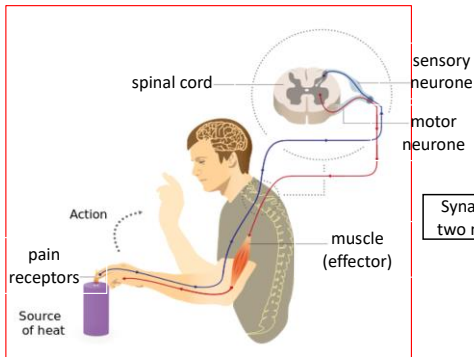
## CELLS AND CONTROL - Part 2



<b>Axon</b>	Carries electrical impulse to axon terminals.
<b>Dendron</b>	Carries electrical impulse from receptor cells in sensory neurones.
<b>Myelin sheath</b>	Insulates the electrical impulse in the neurone.

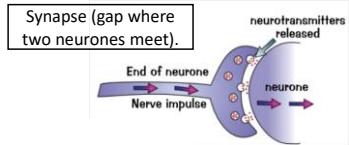


**Reflex Arc**



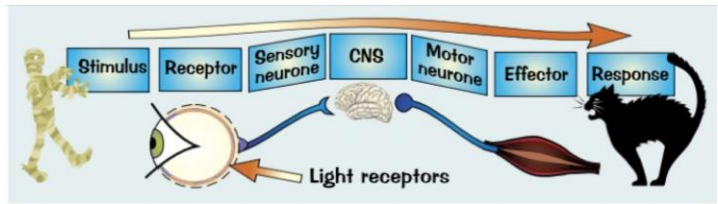
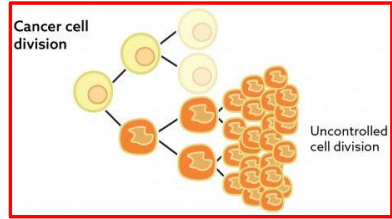
**Structure and functions**

<b>Sensory receptor</b>	Detect stimuli e.g. Pressure cells in skin
<b>Sensory neurone</b>	Long axon carries impulse from receptor to spinal cord.
<b>Synapse</b>	Gap where neurones meet. Chemical message using neurotransmitter.
<b>Relay neurone in CNS</b>	Allows impulses to travel between sensory and motor neurones in the spinal cord.
<b>Motor neurone</b>	Long axon carries impulse from receptor to effector.
<b>Effector</b>	Muscle or gland that carries out response.



**Cancer**

If there's a change in one of the genes that controls cell division, the cell may start dividing uncontrollably. This can result in a mass of abnormal cells called a tumour. If the tumour invades and destroys surrounding tissue it is called cancer.



Impressive reading

Impressive speaking

Impressive writing

Resilience

Graph/Numeracy skills:

Employability via:

<p>Read with purpose: spot the error activity. Research on stem cells</p>	<p>Present your news article for either for or against stem cell</p>	<p>Write a news article about the use of stem cells. Compose an argument for either for or against their use.</p>	<ul style="list-style-type: none"> <li>• Use of transferable mathematical skills.</li> <li>• Scientific investigation skills in using fiddly equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Use percentile graphs to monitor growth</li> </ul>	<p>Cellular scientists, lab technicians, cellular researcher, nurse, <b>Biochemists</b>, Biomedical engineer, Biotechnologist., Chemist, Chemical laboratory technician., Clinical <b>research</b> specialist., Epidemiologist.</p>
<p><b>Culture capital:</b> Ernest McCulloch and James Till discovery of blood forming stem cells.</p>					

**SEND**

<p style="text-align: center;"><b>Communication &amp; Interaction</b></p> <ul style="list-style-type: none"> <li>• Unambiguous terms and clear language used is presentations/handouts</li> <li>• Unambiguous terms and clear language used by teacher</li> <li>• ADHD pupils are given instructions directly by use of their names</li> </ul> <p>Use of post-it plans to help pupils work through a task</p>	<p style="text-align: center;"><b>Cognition &amp; Learning</b></p> <ul style="list-style-type: none"> <li>• Chunking of activities into manageable portions, so as not to lead to cognitive overload</li> <li>• Use of low stakes/high gains activities for knowledge recall</li> <li>• Topics are mapped out visually for pupils to see</li> </ul> <p>Links to previous learning established</p>	<p style="text-align: center;"><b>SEMH</b></p> <ul style="list-style-type: none"> <li>• Consideration to seating positions</li> <li>• Awareness of specific pupil triggers</li> </ul> <p>Communication channels kept open</p>	<p style="text-align: center;"><b>Physical/Sensory</b></p> <ul style="list-style-type: none"> <li>• Consideration to seating positions</li> <li>• Clear access for physically compromised pupils</li> </ul> <p>Opportunities for different sensory learning activities threaded into topics</p>
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<b>Topic: Y10 Key Concepts in Biology</b>			<b>Duration: 12 LESSONS</b>		<b>Composite: Unit test</b>			
<b>Key vocabulary:</b>		<b>Core knowledge Components</b>			<b>Powerful knowledge components crucial to commit to long term memory</b>			
<p>Cell</p> <p>Membrane</p> <p>Nucleus</p> <p>Cytoplasm</p> <p>Mitochondria</p> <p>Ribosome</p> <p>Chloroplast</p> <p>Vacuole</p> <p>Eukaryote</p> <p>Prokaryote</p> <p>Plasmid</p> <p>Flagellum</p> <p>Specialised</p> <p>Gamete</p> <p>Acrosome</p> <p>Epithelia</p> <p>Ciliated</p> <p>Haploid</p> <p>Resolution</p> <p>Magnification</p> <p>Specimen</p> <p>Enzyme</p> <p>Catalyst</p> <p>Active site</p> <p>Denature</p> <p>Optimum</p> <p>Variable</p> <p>Calorimetry</p> <p>Osmosis</p> <p>Diffusion</p> <p>Active transport</p> <p>Gradient</p>		<p><b>CORE</b></p> <ul style="list-style-type: none"> <li>• What are the main parts of a plant and animal cell?</li> <li>• What is the main difference between a prokaryote and a eukaryotic cell?</li> <li>• What is the role of mitochondria in a cell?</li> <li>• What are the major adaptations in eggs and sperm; oviducts and intestines?</li> <li>• What are the names of the parts of the microscope?</li> <li>• What is the equation used to work out the magnification power of a microscope?</li> <li>• What is the equation that can help work out the size of an object using a microscope?</li> <li>• What is diffusion?</li> <li>• Why is osmosis a special kind of diffusion?</li> <li>• What is meant by the term passive?</li> <li>• Why is active transport not a passive process?</li> <li>• Why do animal and plant cells have different structures?</li> <li>• How have technological improvements improved our understanding of cells?</li> <li>• What processes can carry substances into and out of cells?</li> <li>• What are the main steps you should use when setting up and using a microscope?</li> <li>• How can experiments be used to work out the amount of osmosis or diffusion that is occurring?</li> <li>• Outline the role of enzymes in breakdown of food chemicals.</li> <li>• Explain the lock and key theory of enzyme activity.</li> <li>• Explain how graphs can identify the optimum activity and rate of an enzyme reaction.</li> <li>• Explain the effect of temperature and pH on the active site and explain denaturation.</li> </ul>			<ul style="list-style-type: none"> <li>• What are the main parts of a plant and animal cell?</li> <li>• What is the main difference between a prokaryote and a eukaryotic cell?</li> <li>• What is the role of mitochondria and ribosomes in a cell?</li> <li>• What are the major adaptations in eggs and sperm; oviducts and intestines</li> <li>• What are the names of the parts of the microscope?</li> <li>• What is the equation used to work out the magnification power of a microscope?</li> <li>• What is the equation that can help work out the size of an object using a microscope?</li> <li>• What is diffusion?</li> <li>• Why is osmosis a special kind of diffusion?</li> <li>• What are enzymes?</li> </ul>		<p>KS3: Cells, Reproduction (gametes), Light. Particles and solutions, KS4 Cells &amp; Control; Cardiovascular disease; Exchange &amp; Transport in Animals Plants and their structures.</p>	
<b>Impressive reading</b>			<b>Impressive speaking</b>	<b>Impressive writing</b>	<b>Resilience</b>	<b>Employability via:</b>		

Developments in microscopy	Explaining differences in prokaryotic and eukaryotic cells.	Sequencing steps in processes ie setting up a slide	Using the IAMS equation and practicing rearranging in order to problem solve. Changing units.	Working collaboratively, sharing ideas, awareness of safety and biohazards. Well developed numeracy and understanding of scale. Careers: Doctor, nurse, biomedical scientist, physio, ecologist, pharmacist, nutritionist / dietician. Personal trainer.
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**SEND**

**Communication & Interaction Cognition & Learning SEMH Physical/Sensory**

Clear outline of key vocab. Misconceptions outlined, start of lesson retrieval practice, delivery chunked into associated topics and within the lesson. Dual codes where possible and demonstrations with explicit instructions, targeted discussion and questioning with empathetic seating and grouping