

# Cells

Core Lesson 1	Option lesson 1a	Option lesson 1b	Core lesson 2	Option lesson 2a	Core lesson 3	Option lesson 3a
1 ¼ hours	40 minutes	30-60 minutes	1-1 ¼ hours	20-30 minutes	1 hour	30-40 minutes
Microscopes	How are microscopes used	Making slides	Cells	Seeing inside cells	Growing from one cell	Cell cultures
<b><u>Biology Objectives</u></b> Pupils learn the names and functions of different parts of the microscope and how light reaches the eye.	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils learn that cells are the basic unit of life and are organised into tissues, and that tissues make organs. They compare structural differences between animal and plant cells and learn the function of some cell parts.	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils learn that cells make more cells by dividing and that growth occurs when the number of cells increases. Cell division starts with division of the nucleus.	<b><u>Biology Objectives</u></b>
<b><u>Key concepts and processes</u></b> Pupils make observations using a microscope and record these in accurate drawings. They measure the size of the viewed object by choosing the correct equipment and techniques. They understand the benefits of developments in microscope technology.	<b><u>Key concepts and processes</u></b> Pupils plan and carry out a research enquiry on the benefits the invention of the microscope has brought to the development of scientific ideas and to medical applications. They select relevant sources of information and communicate their findings, possibly using ICT.	<b><u>Key concepts and processes</u></b> Pupils develop their competence in using microscopes and in the practical technique of making preparations for viewing under the microscope. They assess risk and take steps to carry out their practical work safely. They draw their specimens using the idea of scale.	<b><u>Key concepts and processes</u></b> Pupils make a model cell to help explain the key similarities and differences between animal and plant cells.	<b><u>Key concepts and processes</u></b> Pupils explain how evidence from microscopic observations of structures within cells has increased knowledge but there are questions about cell function that we cannot yet answer.	<b><u>Key concepts and processes</u></b> Pupils analyse data from secondary sources and use patterns in their findings to provide evidence for scientific explanations of when growth takes place.	<b><u>Key concepts and processes</u></b> Pupils find out about cell culturing and its applications. They contribute to a group presentation or discussion about issues surrounding their use in order to come to their own informed opinion. They select reliable sources of information and communicate, possibly using ICT, their informed opinion and any counterarguments using scientific terminology.
<b>PLTS</b> - Identify questions to answer and problems to resolve, by choosing the correct equipment and techniques to calculate the size of a specimen viewed under the microscope and to draw and label a scale drawing	<b>PLTS</b> - Identify questions to answer and problems to resolve by setting and answering a question about the contribution of microscopes to the advancement of scientific knowledge	<b>PLTS</b> - Anticipate, take and manage risks, by identifying risks and following instructions to safely prepare and view their slide	<b>PLTS</b> - Generate ideas and explore possibilities by using evidence and creativity to make a 3D model cell	<b>PLTS</b> - Identify questions to answer and problems to resolve by finding out how we know about cell structure and function	<b>PLTS</b> - Analyse and evaluate information, judging its relevance and value, by drawing and/or interpreting data from growth charts	<b>PLTS</b> - Consider the influence of circumstances, beliefs and feelings on decisions and events, by recognising that although science informs personal decisions, these are also affected by ethical and moral beliefs with related issues and implications regarding the use of cell culture
<b>Technician's notes</b> Explore: hand lenses, newspapers Extend: microscopes, bench lamp or substage illuminator, eyepiece graticules, prepared slides, microscope slides, sellotape, objects to measure (for example paperclip, pin, grains of salt), transparent 15cm rulers. Pupils should be taught how to carry microscopes safely. When using microscopes that need daylight illumination, ensure that direct sunlight can not strike the mirror. If using an external light source the bulb should not be brighter than 60W.	<b>Technician's notes</b>		<b>Technician's notes</b> Explore and Engage: prepared , stained slides of cheek and onion skin cells, microscopes Extend: cellulose paste or jelly (to represent the cytoplasm), small plastic bags and boxes (to represent the cell wall), bag ties, string or wool, plasticine, ping pong balls and other small balls, dried peas or coloured beads, cling film, small balloons, small clear plastic film containers, sticky tape - these should be unlabelled and left for pupils to use as they see appropriate.		<b>Technician's notes</b> Microscopes, bench lamp or substage illuminator, prepared slides of dividing cells (for example budding yeast), filamentous green algae (such as volvox), graph paper.	<b>Technician's notes</b>

**Assessment:** During each lesson each student should assess their own level using the pupil speak level ladders and show their partner where the evidence is for that level. They should record this in the grid at the front of the book. The member of staff should then assess the level of a maximum of 2 students work each lesson. At the end of each lesson there will be an end of topic test to check the content level.

**Homework:** For each topic there is a task booklet that students should use for homework.

Core lesson 4	Option lesson 4a	Core lesson 5	Option lesson 3a	Option lesson 3b	Option lesson 3c	Option lesson 3d
1 hour	30-60 minutes	1 hour	1 hour	1-2 hours	30 minutes	1 hour
Specialised cells	When cells go wrong	Healthy eating	What goes into our food?	Testing for Vitamin C	Discovering Vitamin C	How salty are crisps?
<b>Biology Objectives</b> Pupils learn there are different types of cells that are specialised to carry out a specific function, and how these specialised cells form tissues and organs to support the seven life processes. They relate the structure of different cells to their function.	<b>Biology Objectives</b>	<b>Biology Objectives</b> Pupils consider the role of the main food nutrients in the body and are able to explain why all cells need them. They are able to identify the sources of the main nutrients and describe their absorption into cells. They are able to explain the importance of a balanced diet and the causes and symptoms of some of the main deficiency diseases.	<b>Biology Objectives</b>	<b>Biology Objectives</b>	<b>Biology Objectives</b>	<b>Biology Objectives</b>
<b>Key concepts and processes</b> Pupils use secondary sources of information to find out about one or two types of specialised cell in greater detail.	<b>Key concepts and processes</b> Pupils plan and carry out a research enquiry. They select reliable sources of information and use their knowledge of cell structure to explain how life processes may be disrupted if normal cell function is disrupted. They communicate their findings using scientific terminology, possibly using ICT. In the process of selecting information they appreciate the collaborative nature of science and how developments are shared across disciplines by publishing results.	<b>Key concepts and processes</b> Pupils use information from secondary sources to explain the benefits to health of using scientific (nutritional) information to prevent deficiency diseases, and contribute to discussions about the use of scientific knowledge in tackling malnutrition.	<b>Key concepts and processes</b> Pupils carry out a research enquiry, selecting relevant information from a range of balanced sources and coming to an informed decision about what they choose to eat. They have the opportunity to consider the economic, social or ethical/moral arguments for and against eating food that is grown out of season or transported from overseas.	<b>Key concepts and processes</b> Pupils use a fair-test principle to test the quantity of vitamin C in a variety of fruit juices to find out which contain the highest quantity of vitamin C. They communicate their findings using scientific conventions for reports.	<b>Key concepts and processes</b> Pupils understand that that misconceptions or individual bias can lead to a range of different explanations for a phenomenon, and that the scientific process can provide evidence to support a theory. Scientific ideas change over time in the light of new information.	<b>Key concepts and processes</b> Pupils plan and carry out an enquiry, using a range of methods, to collect evidence on which is the saltiest crisp.
<b>PLTS</b> - Ask questions to extend their thinking by selecting relevant information to find out how their chosen cell is adapted to its function and how this in turn supports the seven life processes	<b>PLTS</b> - Communicate their learning in relevant ways for different audiences by explaining scientific ideas about cell function to a non-specialist audience	<b>PLTS</b> - Try out alternatives and new solutions and follow ideas through by devising and preparing a healthy alternative to a junk' meal	<b>PLTS</b> - Work towards goals, showing initiative, commitment and perseverance by setting suitable question/s to pursue, deciding on an approach, following appropriate procedures and arriving at an outcome that meets their target/s	<b>PLTS</b> - Analyse and evaluate information, judging its relevance and value by analysing data on the vitamin content of different fruit juices and explaining how this information could be used	<b>PLTS</b> - Explore issues, events or problems from different perspectives by comparing and evaluating different explanations of the cause and treatment of scurvy	<b>PLTS</b> - Support conclusions, using reasoned arguments and evidence by specifying how the evidence supports the conclusion
<b>Technician's notes</b> Extend: cellulose paste or jelly (to represent the cytoplasm), small plastic bags and boxes (to represent the cell wall), bag ties, string or wool, plasticine, ping pong balls and other small balls, dried peas or coloured beads, cling film, small balloons, small clear plastic film containers, sticky tape - these should be unlabelled and left for pupils to use as they see appropriate.		<b>Technician's notes</b> If the food rooms can be used, pupils could prepare their healthy choice meals, rating them for taste.		<b>Technician's notes</b>		
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<b>Homework:</b> For each topic there is a task booklet that students should use for homework.						

Core Lesson 4	Option lesson 4a	Option lesson 4b	Option lesson 4c	Core Lesson 5	Option lesson 5a	Option lesson 5b
1 – 1 ¼ hours	2 lessons	1-2 lessons	40 minutes	1-1 ¼ hours	1 hour	1 hour
Micro-organisms and disease	Testing antimicrobial products	Making yoghurt	Louis Pasteur's experiments	Defences against disease	Antibiotics	Prevention is better than cure
<b><u>Biology Objectives</u></b> Pupils understand that microorganisms (bacteria and fungi) are living and can cause disease and that viruses are not living but also cause disease; and that microorganisms can also be beneficial (considered in the Options).	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils explain how the body fights disease (using the idea of cells, tissues and organs if cells, Unit 8C, have been covered), and explain how immunisation works to improve immunity	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b>
<b><u>Key concepts and processes</u></b> Pupils recognise and explain the evidence for the germ theory of disease and how this evidence was used to refute other ideas such as spontaneous generation. They recognise that creative thinking (putting forward several new hypotheses) contributes to the development of scientific ideas.	<b><u>Key concepts and processes</u></b> Pupils test antimicrobial agents and analyse results to see if some are more effective than others. They analyse risk and work safely.	<b><u>Key concepts and processes</u></b> Pupils carry out a fair-testing enquiry to determine the optimum temperature for manufacturing yoghurt, plot line graphs and analyse findings. They work safely, being aware of the need for food hygiene.	<b><u>Key concepts and processes</u></b> Pupils study the experiments that Louis Pasteur performed to refute the notion of spontaneous generation and provide the evidence for the germ theory of disease. They recognise that theories change when they are not supported by evidence.	<b><u>Key concepts and processes</u></b> Pupils use scientific ideas to explain how infectious disease is prevented and how the body fights off an infection, sequencing a number of steps. They recognise how development of vaccines has improved prevention of some serious illnesses.	<b><u>Key concepts and processes</u></b> Pupils explain the importance of the use of antibiotics in saving lives and treating infectious disease, and the potential drawbacks should antibiotics become ineffective and no new antibiotics be developed.	<b><u>Key concepts and processes</u></b> Pupils find out about the ways infections can be transmitted and thus the ways that risk of infection can be minimised. They communicate their findings using scientific terms, optionally using ICT.
<b>PLTS</b> - Connect their own and others' ideas and experiences in inventive ways by responding imaginatively to the historical context of ideas about how diseases spread and offering interpretations of where creative thinking led to new ideas	<b>PLTS</b> - Support conclusions, using reasoned arguments and evidence, by explaining why some products are more effective at preventing the growth of bacteria	<b>PLTS</b> - Organise time and resources, prioritising actions by suggesting when their yoghurt will be ready for testing and recommending how the yoghurt should be stored until the next lesson	<b>PLTS</b> - Explore issues, events or problems from different perspectives by evaluating different experiments to support or refute the theory of spontaneous generation	<b>PLTS</b> - Collaborate with others to work towards common goals by managing discussion in order to share ideas and explanations	<b>PLTS</b> - Collaborate with others to work towards common goals by sharing findings and making a presentation to other members of the class	<b>PLTS</b> - Analyse and evaluate information, judging its relevance and value, by producing advice on an aspect of health and hygiene
	<b>Technician's notes</b>					

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At the end of each lesson there will be an end of topic test to check the content level.

**Homework:** For each topic there is a task booklet that students should use for homework.

Option lesson 5c	Option lesson 5d
1 hour	40 minutes
Should we vaccinate?	Sexually transmitted infections
<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b>
<p><b><u>Key concepts and processes</u></b></p> <p>The purpose is threefold: first for pupils to decide what is an acceptable risk; second to help pupils realise the influence of newspaper reports depends on the way they are written, by showing how to analyse text for fact and opinion; and third, to understand that science cannot provide a conclusive answer to the question of risk.</p>	<p><b><u>Key concepts and processes</u></b></p> <p>Pupils carry out a game or simulation to model how quickly infections spread, and to show that often no symptoms are visible. They use case study scenarios as an opportunity to explore personal issues, finding out about the bacteria and viruses associated with sexually transmitted infections and how to be protected against them.</p>
<p><b>PLTS</b> - Consider the influence of circumstances, beliefs and feelings on decisions and events, by recognising that although science informs personal decisions, these are also affected by personal perception of risk and by ethical and moral beliefs</p>	<p><b>PLTS</b> - Analyse and evaluate information, judging its relevance and value, by describing the cause and symptoms of some common STIs and recognising how to decrease their spread</p>