

# Humans, health

Core Lesson 1	Option lesson 1a	Core Lesson 2	Option lesson 2a	Option lesson 2b	Core Lesson 3	Option lesson 3a
1 ¼ hours	40-50 minutes	1 ½ hour	40-50 minutes	20-30 minutes	1 hour	30 minutes
Adsorbing nutrients	Digestion of Starch	Specialised Organs	How is the small intestine specialized?	What is colour blindness?	Healthy eating	Discovering Vitamin C
<b>Biology Objectives</b> Pupils understand some nutrients are made of large molecules that need to be chemically broken into small molecules to enable them to be absorbed into the bloodstream. They describe the function of organs and cell structures in the digestive system in nutrition.	<b>Biology Objectives</b>	<b>Biology Objectives</b> Pupils understand that groups of specialised cells form tissues, that tissues can form organs, and that groups of organs form organ systems. They learn that external stimuli are detected by particular cells and that these sensor cells are grouped into specialised tissues. They explain how the specialisation of cells supports life processes.	<b>Biology Objectives</b>	<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>Key concepts and processes</b> Pupils use models and analogies to describe how enzymes aid digestion and how partially permeable membranes allow absorption of molecules across the gut wall. They identify strengths and weaknesses of the model.	<b>Biology Objectives</b>	<b>Key concepts and processes</b> Pupils make a 3D anatomical model of the structures in the eye and use their model to produce a report or presentation explaining how the tissues and specialised cells help the eye perform its function	<b>Key concepts and processes</b> Pupils make an annotated diagram or model to describe and explain how the small intestine is specialised for absorption.	<b>Key concepts and processes</b> Pupils find out about colour blindness and produce a report to explain what it is, using scientific vocabulary about specialised cells. They report on some of the implications of the condition.	<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 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>PLTS</b> - Support conclusions, using reasoned arguments and evidence, by explaining how the model gut is an analogy of a real gut and where this analogy breaks down	<b>Key concepts and processes</b> Pupils investigate temperature as a variable in digestion and look for a pattern in their results. They draw conclusions in terms of human body temperature and draw on abstract ideas to explain their conclusions in terms of a particle model and energy transfer.	<b>PLTS</b> - Connect their own and others' ideas and experiences in inventive ways by sharing ideas about realistic or appropriate materials for making their model	<b>PLTS</b> - Try out alternatives or new solutions and follow ideas through by making a diagram or a model of the small intestine to explain the processes of digestion and absorption	<b>PLTS</b> - Organise time and resources, prioritising actions by setting targets and managing time to complete a report explaining colour blindness	<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> - Explore issues, events or problems from different perspectives by comparing and evaluating different explanations of the cause and treatment of scurvy
<b>Technician's notes</b> 1% starch solution, 1% amylase solution, Visking tubing tied at one end, cotton or thread, 100cm <sup>3</sup> beakers, 0.1M iodine solution in dropper bottle, spotting tile, dropping pipette, Benedict's solution (see CLEAPSS recipe card 18) or glucose dip sticks (Clinistix), 400cm <sup>3</sup> glass beakers for water bath, boiling tubes and rack, kettle to provide hot water, stopwatches.	<b>PLTS</b> - Analyse and evaluate information, judging its relevance and value by explaining how the model simulates the digestive process while recognizing where the model breaks down	<b>Technician's notes</b> Suggested materials for model eye (pupils could come up with their own ideas): paper, scissors, tape, glue, clingfilm, red and yellow wool, zipped plastic sandwich bag, bubble wrap with large bubbles. Digital cameras for pupils to record their model in their presentation. Optional Model eye demonstration with fluorescein in flask			<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> As core lesson

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

Option lesson 3b	Core Lesson 4	Option lesson 4a	Option lesson 4b	Core Lesson 5	Option lesson 5a	Option lesson 5b
1 hour	1 – 1 ¼ hours	2 lessons	40 minutes	1-1 ¼ hours	1 hour	1 hour
How salty are crisps?	Micro-organisms and disease	Testing antimicrobial products	Louis Pasteur's experiments	Defences against disease	Antibiotics	Should we vaccinate?
<b>Biology Objectives</b>	<b>Biology Objectives</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>Biology Objectives</b>	<b>Biology Objectives</b>	<b>Biology Objectives</b> Pupils explain how the body fights disease (using the idea of cells, tissues and organs if cells, Unit 3C, have been covered), and explain how immunisation works to improve immunity	<b>Biology Objectives</b>	<b>Biology Objectives</b>
<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>Key concepts and processes</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>Key concepts and processes</b> Pupils test antimicrobial agents and analyse results to see if some are more effective than others. They analyse risk and work safely.	<b>Key concepts and processes</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>Key concepts and processes</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>Key concepts and processes</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>Key concepts and processes</b> 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.
<b>PLTS</b> - Support conclusions, using reasoned arguments and evidence by specifying how the evidence supports the conclusion	<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> - 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> - 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
		Technician's notes		Technician's notes	Technician's notes	

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Option lesson 5c	Core lesson 6	Option lesson 6a	Core lesson 7	Option lesson 7a	Core lesson 8	Option lesson 8a
40 minutes	1 hour	40 minutes	1 hour	30-60 minutes	1 hour	20-30 minutes + writeup
Sexually transmitted infections	Drugs and health	Food, mood and brainpower	Specialised cells	When cells go wrong	Genes	Extracting DNA
<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> This lesson starts with the perceptions pupils have of drugs and then looks at the effect of one drug, caffeine, as a stimulant and how it affects the nervous system	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></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><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils learn that they have 2 sets of chromosomes in the nucleus of each cell, with the exception of egg and sperm cells that only have 1 set. They describe that the single set of chromosomes and genes of one parent join with the set from the other parent.	<b><u>Biology Objectives</u></b>
<b><u>Key concepts and processes</u></b> 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.	<b><u>Key concepts and processes</u></b> Pupils plan and carry out an enquiry to help them test a hypothesis about the effect of caffeine on the nervous system. They carry out a fair test enquiry and look for consistency in the data obtained using different methods and decide to what extent their results are valid	<b><u>Key concepts and processes</u></b> Pupils select and analyse relevant information from secondary sources to find out about so-called 'good mood foods' and how these affect health and behaviour. The enquiry also provides a chance for pupils to come to an informed decision about what they decide to eat.	<b><u>Key concepts and processes</u></b> Pupils use secondary sources of information to find out about one or two types of specialised cell in greater detail.	<b><u>Key concepts and processes</u></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><u>Key concepts and processes</u></b> Pupils model breeding with beads to determine the sex of offspring, understanding how the model supports our current understanding of inheritance of characteristics.	<b><u>Key concepts and processes</u></b> Pupils carry out the steps involved in isolating DNA, appreciating the purpose of each step. They communicate these steps in an appropriate way for other learners.
<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	<b>PLTS</b> – Plan and carry out research, appreciating the consequences of decisions, by planning an enquiry taking into account the effect of their experimental design on the outcome.	<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> - 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> – Support conclusions, using reasoned arguments and evidence, by using a model of inheritance to explain how sex is determined in humans	<b>PLTS</b> - Communicate their learning in relevant ways for different audiences by creating a poster to teach someone else how to purify DNA
<b>Technician's notes</b>	<b>Technician's notes</b> Caffeinated and non-caffeinated soft drinks poured into small cups, rulers and stopwatches		<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> Popper beads of 2 colours; 2 beakers per group, one filled with one colour of beads and the other with equal numbers of 2 colours of beads	

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Core Lesson 9	Option lesson 9a	Core Lesson 10	Option lesson 10a	Core Lesson 11
1 hour	20-30 minutes + independent study	1 hour	30-40 minutes	1 hour
Selective Breeding	Issues of animal welfare	Genetic engineering	Consequences of genetic engineering	Stem cells
<b><u>Biology Objectives</u></b> Pupils learn that the nucleus in a cell contains genes that control all the characteristics of the organism, and use this to explain how selective breeding increases the chance of desired genes being passed on.	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils learn that that genes present in the nucleus of the cell can be transferred to other species resulting in new features – variation through genetic engineering. They focus on the mechanism of gene transfer and consider the myths and misinformation surrounding the issue	<b><u>Biology Objectives</u></b>	<b><u>Biology Objectives</u></b> Pupils learn that there are 3 types of stem cell, that they can grow into any type of tissue and that embryonic stem cells are the most controversial .
<b><u>Key concepts and processes</u></b> Pupils choose a question about selective breeding to describe and explain how an organism has changed over time and how desired characteristics have been bred into the organism.	<b><u>Key concepts and processes</u></b> Pupils consider why animals are selectively bred and the animal welfare concerns that surround the practice. They present the arguments for and against, and come to an informed decision whether the benefits outweigh potential concerns over welfare.	<b><u>Key concepts and processes</u></b> Pupils design a genetically modified organism (GMO) and describe the issues, benefits and drawbacks related to creating this organism and how the decisions about the use of this GMO may be influenced by its impact on people and the environment.	<b><u>Key concepts and processes</u></b> The development of techniques for altering the genetic make-up of humans as well as animals has proceeded at a much faster pace than the discussion of the moral and social implications. Pupils plan and carry out a focused research enquiry, selecting and analysing relevant information from secondary sources to find out about and explain the ethical and moral arguments around human genetic engineering, or engineering animals to produce drugs that may prolong human life.	<b><u>Key concepts and processes</u></b> Pupils present the arguments for and against the use of embryonic stem cells to treat medical conditions, and come to an informed decision whether or not to support such research
<b>PLTS</b> - Identify questions to answer and problems to resolve, by finding out about a named organism and how it has changed through delective breeding.	<b>PLTS</b> - Try to influence others, negotiating and balancing diverse views to reach workable solutions by coming to an informed opinion and taking action	<b>PLTS</b> -	<b>PLTS</b> - Consider the influence of circumstances, beliefs and feelings on decisions and events, by considering the moral and ethical implications of genetic engineering	<b>PLTS</b> – Consider the influence of circumstances, beliefs and feelings on decisions and events, by comparing the arguments for and against the use of embryonic stem cells and coming to an informed decision.
<b>Technician's notes</b>				<b>Technician's notes</b>

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