

	Lesson title	Lesson objectives
Chapter 1 Cell Biology		
1.1	Looking at cells	<ul style="list-style-type: none"> Describe the structure of eukaryotic cells. Explain how the main sub-cellular structures are related to their functions.
1.2	The light microscope	<ul style="list-style-type: none"> Observe plant and animal cells with a light microscope. Understand the limitations of light microscopy.
1.3	Looking at cells in more detail	<ul style="list-style-type: none"> Identify the differences in the magnification and resolving power of light and electron microscopes. Explain how electron microscopy has increased our understanding of sub-cellular structures.
1.4	Required practical: Using a light microscope to observe and record cells	<ul style="list-style-type: none"> Apply knowledge to select techniques, instruments, apparatus and materials to observe cells. Make and record observations and measurements. Present observations and other data using appropriate methods.
1.5	Primitive cells	<ul style="list-style-type: none"> Describe and explain the differences between prokaryotic cells and eukaryotic cells. Explain how the main sub-cellular structures of prokaryotic and eukaryotic cells are related to their functions.
1.6	Cell division	<ul style="list-style-type: none"> Describe the process of mitosis in growth, and mitosis as part of the cell cycle. Describe how the process of mitosis produces cells that are identical genetically to the parent cell.
1.7	Cell differentiation	<ul style="list-style-type: none"> Explain the importance of cell differentiation. Describe how cells, tissues, organs and organ systems are organised to make up an organism. Understand size and scale in relation to cells, tissues, organs and body systems.
1.8	Cancer	<ul style="list-style-type: none"> Describe cancer as a condition resulting from changes in cells that lead to their uncontrolled growth, division and spread. Understand some of the risk factors that trigger cells to become cancerous.
1.9	Stem cells	<ul style="list-style-type: none"> Describe the function of stem cells in embryonic and adult animals. Discuss potential benefits and risks associated with the use of stem cells in medicine.
1.10	Stem cell banks	<ul style="list-style-type: none"> Discuss potential benefits and risks associated with the use of stem cells in medicine.
1.11	Key concept: Cell development	<ul style="list-style-type: none"> Give examples of where mitosis is necessary to produce identical daughter cells. Understand the need for the reduction division, meiosis. Describe the use and potential of cloned cells in biological research.
1.12	Cells at work	<ul style="list-style-type: none"> Explain the need for energy. Describe aerobic respiration as an exothermic reaction.
1.13	Living without oxygen	<ul style="list-style-type: none"> Describe the process of anaerobic respiration Compare the processes of aerobic and anaerobic respiration. Explain how the body removes lactic acid produced during anaerobic respiration.

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Chapter 1 Cell Biology		
1.14	Growing microorganisms	<ul style="list-style-type: none"> Describe the techniques used to produce uncontaminated cultures of microorganisms. Describe how bacteria reproduce by binary fission. Calculate the number of bacteria in a population.
1.15	Testing new antibiotics	<ul style="list-style-type: none"> Use appropriate apparatus to investigate the effect of antibiotics on bacterial growth. Use microorganisms safely. Apply sampling techniques to ensure that samples are representative.
1.16	Required practical: Investigating disinfectants	<ul style="list-style-type: none"> Carry out experiments with due regard to health and safety. Present and process data, identifying anomalous results. Evaluate methods and suggest further investigations.
1.17	Maths skills: Size and number	<ul style="list-style-type: none"> Make estimates for simple calculations, without using a calculator. Use ratio and proportion to calibrate a microscope. Recognise and use numbers in decimal and standard form.
Chapter 2 Photosynthesis		
2.1	Explaining photosynthesis	<ul style="list-style-type: none"> Identify the raw materials and products of photosynthesis. Describe photosynthesis by an equation. Explain gas exchange in leaves.
2.2	Looking at photosynthesis	<ul style="list-style-type: none"> Explain the importance of photosynthesis. Explain how plants use the glucose they produce.
2.3	Investigating leaves	<ul style="list-style-type: none"> Identify the internal structures of a leaf. Explain how the structure of a leaf is adapted for photosynthesis. Recall that chloroplasts absorb energy from light for photosynthesis.
2.4	Required practical: Investigate the effect of light intensity on photosynthesis	<ul style="list-style-type: none"> Use scientific ideas to develop a hypothesis. Use the correct sampling techniques to ensure that readings are representative. Present results in a graph.
2.5	Increasing photosynthesis	<ul style="list-style-type: none"> Identify factors that affect the rate of photosynthesis. Interpret data about the rate of photosynthesis. Explain the interaction of factors in limiting the rate of photosynthesis.
2.6	Increasing food production	<ul style="list-style-type: none"> Explain how factors that increase food production can be controlled. Evaluate the benefits of manipulating the environment to increase food production. Understand and use the inverse square law in the context of light intensity and photosynthesis.
2.7	Key concept: Diffusion in living systems	<ul style="list-style-type: none"> Describe the conditions needed for diffusion to occur. Calculate and compare surface area to volume ratios. Explain how materials pass in and out of cells.

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Chapter 2 Photosynthesis		
2.8	Looking at stomata	<ul style="list-style-type: none"> Describe transpiration in plants. Describe the function of stomata. Explain the relationship between transpiration and leaf structure.
2.9	Moving water	<ul style="list-style-type: none"> Describe the structure and function of xylem and roots. Describe how xylem and roots are adapted to absorb water. Explain why plants in flooded or waterlogged soil die.
2.10	Investigating transpiration	<ul style="list-style-type: none"> Describe how transpiration is affected by different factors. Explain the movement of water in the xylem.
2.11	Moving sugar	<ul style="list-style-type: none"> Describe the movement of sugar in a plant as translocation. Explain how the structure of phloem is adapted to its function in the plant. Explain the movement of sugars around the plant.
2.12	Maths skills: Surface area to volume ratio	<ul style="list-style-type: none"> Be able to calculate surface area and volume. Be able to calculate surface area to volume ratio. Know how to apply ideas about surface area and volume.
Chapter 3 Moving and changing materials		
3.1	Explaining water movement	<ul style="list-style-type: none"> Describe how water moves by osmosis in living tissues. Identify factors that affect the rate of osmosis. Explain what the term 'partially permeable membrane' means.
3.2	Required practical: Investigate osmosis	<ul style="list-style-type: none"> Use scientific ideas to develop a hypothesis. Plan experiments to test a hypothesis. Draw conclusions from data and compare these with hypotheses made.
3.3	Learning about active transport	<ul style="list-style-type: none"> Describe active transport. Explain how active transport is different from diffusion and osmosis. Explain why active transport is important.
3.4	Key concept: Investigating the need for transport systems	<ul style="list-style-type: none"> Describe how the size of an organism affects the rate of diffusion. Explain how changes in conditions affect the rate of diffusion. Explain the need for exchange surfaces and transport systems using surface area to volume ratio.
3.5	Explaining enzymes	<ul style="list-style-type: none"> Describe what enzymes are and how they work. Explain the lock-and-key theory. Use the collision theory to explain enzyme action.
3.6	Required practical: Investigate the effect of pH on the rate of reaction of amylase enzyme	<ul style="list-style-type: none"> Describe how safety is managed, apparatus is used and accurate measurements are made. Explain how representative samples are taken. Make and record accurate observations. Draw and interpret a graph from secondary data using knowledge and observations.
3.7	Learning about the digestive system	<ul style="list-style-type: none"> Identify and locate the organs in the digestive system, and describe their functions. Describe how the products of digestion are absorbed into the body. Explain why the small intestine is an efficient exchange surface.

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Chapter 3 Moving and Changing materials		
3.8	Explaining digestion	<ul style="list-style-type: none"> Describe how physical digestion helps to increase the rate of chemical digestion. Name the sites of production and action of specific enzymes. Interpret data about digestive enzymes.
3.9	Required practical: Use qualitative reagents to test for a range of nutrients	<ul style="list-style-type: none"> Suggest appropriate apparatus for the procedures. Describe how safety is managed and apparatus is used. Describe how accurate measurements are made. Interpret observations and make conclusions.
3.10	Looking at more exchange surfaces	<ul style="list-style-type: none"> Identify the structures responsible for gas exchange in fish, amphibians and insects. Describe the adaptations of different gas exchange surfaces. Explain the gas exchange surfaces in amphibians.
3.11	Learning about plants and minerals	<ul style="list-style-type: none"> Describe how mineral ions from the soil help plants to grow. Explain how root hair cells are adapted for efficient osmosis. Describe the function of different mineral ions in a plant.
3.12	Investigating how plants use minerals	<ul style="list-style-type: none"> Describe why plants need different mineral ions. Explain the effects of mineral deficiencies on plant growth. Explain the importance of fertilisers.
3.13	Learning about the circulatory system	<ul style="list-style-type: none"> Identify the parts of the circulatory system. Describe the functions of the parts of the circulatory system. Explain how the structure of each part of the circulatory system relates to its function.
3.14	Exploring the heart	<ul style="list-style-type: none"> Describe the structure and functions of the heart. Identify the functions and adaptations of the parts of the heart. Explain the movement of blood around the heart.
3.15	Studying blood	<ul style="list-style-type: none"> Identify the parts of the blood and their functions. Explain the adaptations of red blood cells. Explain how red blood cells and haemoglobin transport oxygen efficiently.
3.16	Investigating gas exchange	<ul style="list-style-type: none"> Identify the parts of the human gas exchange system and know their functions. Explain how gas exchange occurs in humans. Explain the adaptations of the gas exchange surfaces.
3.17	Learning about coronary heart disease	<ul style="list-style-type: none"> Identify the causes and symptoms of coronary heart disease. Describe possible treatments of coronary heart disease. Evaluate the possible treatments of coronary heart disease.
3.18	Maths skills: Extracting and interpreting information	<ul style="list-style-type: none"> To extract and interpret information from tables, charts and graphs.
Chapter 4 Health Matters		
4.1	Learning about health	<ul style="list-style-type: none"> Recall the difference between health and disease. Explain how some diseases interact. Evaluate data about lifestyle and health.
4.2	Key concept: Looking at risk factors	<ul style="list-style-type: none"> Recall the causes of some non-communicable diseases. Describe the impact of lifestyle on non-communicable diseases. Explain the impact of lifestyle on non-communicable diseases.

	Lesson title	Lesson objectives
Chapter 4 Health matters		
4.3	Exploring non-communicable diseases	<ul style="list-style-type: none"> Identify risk factors for cancer. Explain the differences between types of tumours. Explain the impact of non-communicable diseases
4.4	Analysing and evaluating data	<ul style="list-style-type: none"> Translate information between graphical and numerical forms. Use scatter diagrams to identify correlations. Evaluate the strength of evidence.
4.5	Studying pathogens	<ul style="list-style-type: none"> Recall the definition of a pathogen. Explain how communicable diseases can be controlled. Distinguish between epidemics and pandemics.
4.6	Learning about viral diseases	<ul style="list-style-type: none"> Describe the symptoms of some viral diseases. Describe the transmission and control of some viral diseases. Explain how some viral diseases are spread.
4.7	Studying bacterial diseases	<ul style="list-style-type: none"> Describe the symptoms of some bacterial diseases. Explain how some bacterial diseases can be controlled. Compare and contrast bacterial and viral diseases.
4.8	Looking at fungal diseases	<ul style="list-style-type: none"> Recall the name and symptoms of a fungal disease. Describe the transmission and treatment of rose black spot. Explain how rose black spot affects the growth of the plant.
4.9	Learning about malaria	<ul style="list-style-type: none"> Recall that malaria is a protist disease. Describe the lifecycle of the malarial vector.
4.10	Protecting the body	<ul style="list-style-type: none"> Describe how the body protects itself from pathogens. Explain how the body protects itself from pathogens. Explain how communicable diseases can be spread.
4.11	Exploring white blood cells	<ul style="list-style-type: none"> Describe phagocytosis. Explain how antibody production can lead to immunity. Explain the specificity of immune system responses
4.12	Using antibiotics and painkillers	<ul style="list-style-type: none"> Describe the uses of antibiotics and painkillers. Explain how antibiotics and painkillers can be used to treat diseases. Explain the limitations of antibiotics.
4.13	Building immunity	<ul style="list-style-type: none"> Recall how vaccinations prevent infection. Explain how mass vaccinations reduce the spread of disease. Evaluate the global use of vaccination.
4.14	Making new drugs	<ul style="list-style-type: none"> Recall some traditional drugs and their origins. Describe how new drugs are developed. Explain why 'double-blind' trials are conducted.
4.15	Investigating monoclonal antibodies	<ul style="list-style-type: none"> Describe uses of monoclonal antibodies. Explain how monoclonal antibodies are produced. Evaluate the use of monoclonal antibodies.
4.16	Looking at plant diseases	<ul style="list-style-type: none"> Recall the causes of plant diseases. Describe the symptoms and identification methods of some plant diseases. Explain the use of monoclonal antibodies in identifying plant pathogens.
4.17	Learning about plant defences	<ul style="list-style-type: none"> Recall some physical plant defence responses. Explain how plant defence systems help them survive.
4.18	Maths skills: Sampling and scientific data	<ul style="list-style-type: none"> Understand why sampling is used in science. Be able to explain different sampling techniques. Be able to extract and interpret information from graphs.