

	Autumn Term	Spring Term	Summer Term
Topic	<b>Topic 1 - Cell Biology</b>	<b>Topic 3 – Infection and response</b>	<b>Topic 4 - Bioenergetics</b>
	<ul style="list-style-type: none"> <li>Understand that cells are the basic unit of all forms of life. To understand how structural differences between types of cells enables them to perform specific functions within the organism.</li> <li>Understand that these differences in cells are controlled by genes in the nucleus. For an organism to grow, cells must divide by mitosis producing two new identical cells. If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells.</li> <li>Understand that this phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells.</li> <li>Understand that substances may move into and out of cells across the cell membranes via diffusion.</li> </ul>	<ul style="list-style-type: none"> <li>Understand that pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants.</li> <li>They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill.</li> <li>To explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination.</li> <li>To understand that since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria.</li> <li>Unfortunately, many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics.</li> </ul>	<ul style="list-style-type: none"> <li>Understand how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere.</li> <li>Understand that both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy.</li> <li>Understand that during vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue.</li> </ul>
	<b>Topic 2 - Organisation</b>		
	<ul style="list-style-type: none"> <li>Understand that the human digestive system provides the body with nutrients.</li> <li>Understand the respiratory system provides the body with oxygen and removes carbon dioxide.</li> </ul>		

	<ul style="list-style-type: none"> <li>• Understand that they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system.</li> <li>• Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle.</li> <li>• Understand the effect of non-communicable diseases on the body and the impact of diet and lifestyle.</li> <li>• Understand how plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.</li> </ul>		
Vocabulary	<p><b>Topic 1</b> – Eukaryotes, prokaryotes, plasmid, nucleus, DNA, membrane, cell wall, chloroplast, ribosome, mitochondria, osmosis, active transport, differentiation, xylem, phloem, mitosis, meiosis, stem cells, diffusion.</p> <p><b>Topic 2</b> – Cell, tissue, organ, organ system, enzymes, heart, arteries, veins, capillaries, blood, plasma, coronary heart disease, non-communicable diseases, diet, lifestyle, cancer.</p>	<p><b>Topic 3</b> – Pathogens, measles, HIV, tobacco mosaic virus, antibody, antitoxin, vaccination, antibiotic, toxicity, efficacy, fungal black spot,</p>	<p><b>Topic 4</b> – Photosynthesis, chloroplasts, chlorophyll, respiration, limiting factor, aerobic respiration, anaerobic respiration, fermentation, lactic acid, exercise, metabolism,</p>
Links to KS3 Curriculum	<p><b>Topic 1</b></p> <ul style="list-style-type: none"> <li>• Understand that cells are the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope, the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts</li> <li>• Understand the similarities and differences between plant and animal cells</li> </ul>	<p><b>Topic 3</b></p> <ul style="list-style-type: none"> <li>• Understand the effects of recreational drugs (including substance misuse) on behaviour, health and life processes</li> </ul>	<p><b>Topic 4</b></p> <ul style="list-style-type: none"> <li>• Understand the reactants in, and products of, photosynthesis, and a word summary for photosynthesis and the adaptations of leaves for photosynthesis.</li> <li>• Understand that aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life. Be able to write a word summary for aerobic respiration.</li> </ul>

- Understand the role of diffusion in the movement of materials in and between cells
- Understand the structural adaptations of some unicellular organisms
- Understand the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms

### Topic 2

- Understand the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed
- Know how to calculate energy requirements in a healthy daily diet
- Understand the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- Understand the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
- Understand the importance of bacteria in the human digestive system
- Understand that plants make carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots
- Understand the structure and functions of the gas exchange system in humans, including adaptations to function
- Understand the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume

- Understand the process of anaerobic respiration in humans and micro-organisms, including fermentation, and a word summary for anaerobic respiration.
- Understand the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.

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|  | <ul style="list-style-type: none"><li>• Understand the impact of exercise, asthma and smoking on the human gas exchange system</li><li>• Understand the role of leaf stomata in gas exchange in plants</li></ul> |  |  |
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