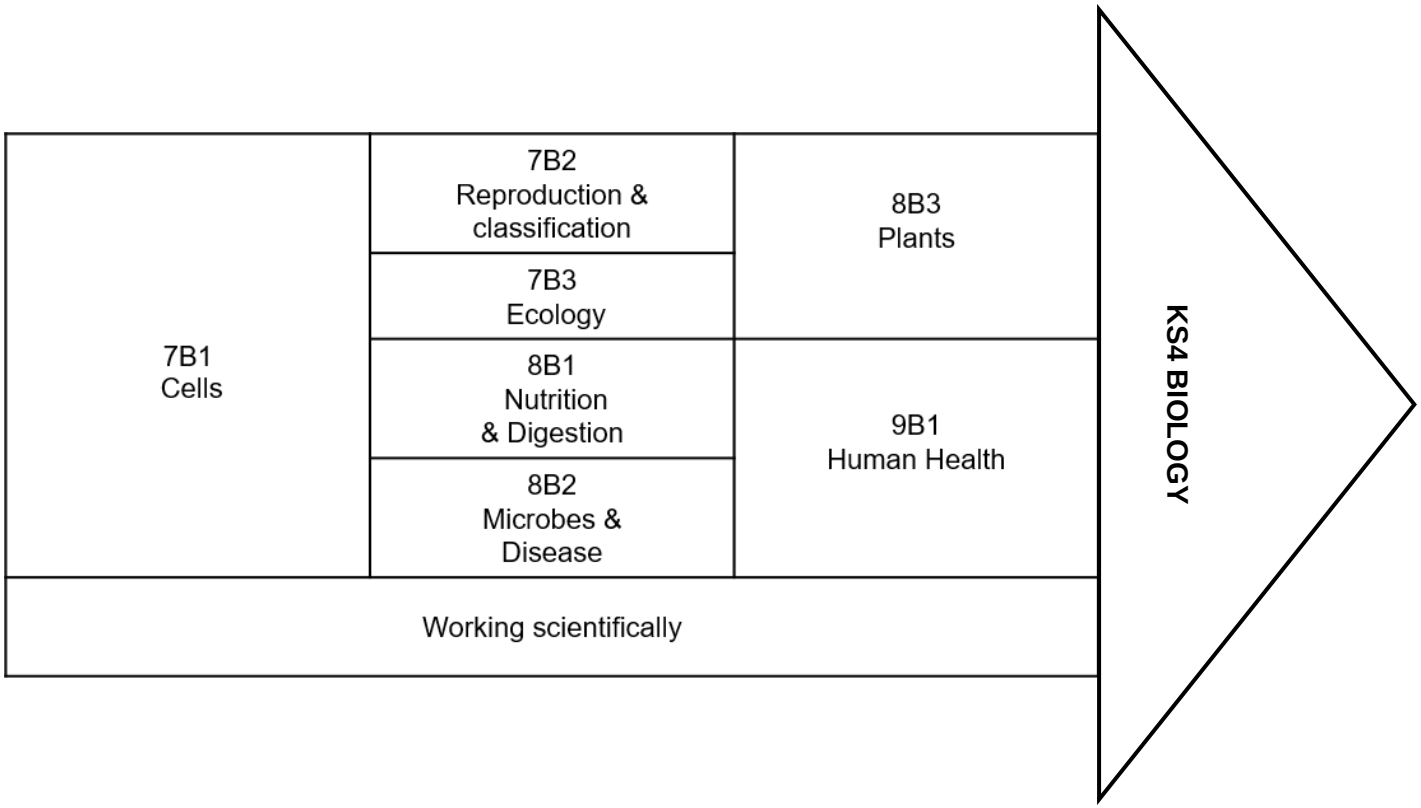
KS3 Biology – Curriculum overview



The above arrow shows the progression of biology topics across Key Stage 3. It shows how substantive knowledge is built upon in a sequential nature to prepare learners for KS4 Biology. Running alongside and integrated throughout is the thread of working scientifically whereby students develop their knowledge of scientific methods, apparatus and data analysis.

KS3 Curriculum Intent - Biology

Intent **By the end of KS3 students are able to…**		**What new knowledge/content do we introduce?**			**How does this curriculum go beyond the National Curriculum? How does going beyond the NC ensure challenge?**
		Year 7	**Year 8**	**Year 9**	
Employ substantive knowledge to explain hierarchal nature of multicellular organisms. Have a thorough substantive knowledge of the structure and functioning of systems of the human body and of plants. Understand the causes of variation and explain its importance to natural selection and ecosystems. Be equipped with the disciplinary knowledge to understand how scientific knowledge is generated and grows.	**Autumn**	**Intro to science** • Understanding variables and experimental methods • Learning types of data and graphing **Cells** • Cells and their organelles, including use of a microscope • Organisation of cells into systems • Specialised cells • Diffusion and osmosis	**Nutrition & digestion** • Balanced diet and nutrient deficiencies. • Organs of the digestive system, including their structure and function.	**Human health** • The function of the skeleton and musculature of the human body. • The functioning of the circulatory system, including how blood vessels relate to function. • The structure and diseases of the respiratory system. • How the human body responds to the demands of exercise	Cells: introduces osmosis to introduce the notion of partially permeable membranes. Reproduction & inheritance: includes an ethical debate on the use of IVF. Ecology: uses specimens to show examples of adaptations that will be unfamiliar to students. Nutrition & digestion: emphasises the process of absorption in the intestine through visking tube experiment. Microbes & disease: practices growing bacterial cultures on agar plates to embed aseptic techniques. Plants: introduces root types and transport within xylem and phloem to explore plant systems. Human health: relates energy demands and fitness to knowledge of circulatory system,
	Spring	**Reproduction and classification** • Structure of the reproductive systems • Menstrual cycle and gestation • Causes of variation • Classification systems	**Microbes & disease** • Types of pathogen and their transmissions in both animals and plants • Structure of pathogens, including bacterial and fungal cells. • Looking at the uses of microorganisms • The immune response	**Cell Biology** • The function of organelles and calculating magnification. • The process of the cell cycle and the uses of stem cells. • The role of diffusion, osmosis and active transport in the movement of materials in and between cells.	
	Summer	**Ecology** • Energy through food chains/webs and inter-dependence • Adaptation for survival, including plants • Human impact on biodiversity • Sampling techniques and fieldwork	**Plants** • Organisation of plant structure, including the role of flowers in reproduction. • The process of photosynthesis and the role of the leaf. • Transport within plants.	**Bioenergetics** • The equations of photosynthesis and the uses of glucose. • Limiting factors of photosynthesis including graphs.	

				• The differences between aerobic and anaerobic respiration and how the energy released can be used, along with oxygen debt.	Cell biology: introduces calculations for magnification. Bioenergetics: includes chemical formulae for key processes and balanced chemical equations.
	Rationale for this sequence	Students arrive with a diverse, and often-limited, understanding of scientific principles. The introduction to science topic redresses this by introducing the principles of scientific investigation. This is followed by Cells, which establishes cells as the basic unit of all life and begins to look at their functions and diversity. Reproduction and classification then explores specialised cells in the context of the reproductive system. It explores the menstrual cycle and gestation to introduce variation and leads into how biologists make sense of such diversity through classification systems. With the concept of reproduction, species and classification introduced, students can now explore the interactions within ecosystems and learn about the inter-dependence of species as well as human activity threaten biodiversity.	Students revisit their learning of cells and systems in Year 7 and widen it by learning the role of individual organs within the digestive system. They study the importance of balanced diets and are introduced to diseases in the context of nutrient deficiencies. This understanding of diseases is then deepened by exploring communicable diseases. This includes introducing pathogens and their cell structures, modes of transmission and the immune response. In doing so, students are exposed to knowledge of bacterial and fungi cells, which invites comparisons with existing knowledge of animals and plant cells. The Plants topic ties together several previous strands from Year 7 and Year 8. It does this by revisiting cells and systems, reproduction and adaptation, and energy requirements and deficiencies. However, the context of plants allows for students to build upon their existing knowledge and go beyond it by learning new knowledge about the role of photosynthesis and plant transport.	Having learned the function of cells and the role of systems in Year 7 and Year 8, Year 9 begins with a topic on the human body. This topic takes a more macroscopic approach to look at the body as a functioning whole. It introduces the circulatory and respiratory system (including respiratory diseases, building on Year 8) - and how they interact with one another to meet the demands of the human body during exercise. Being able to benefit from their wider understanding of the human body as a whole, students now revisit cell biology. Here, not only is their previous understanding widened - microscopes are revisited with calculations, more organelles are introduced, movement within cells is explored with experiments – new content is introduced such as the process of the cell cycle and the use of stem cells. Bioenergetics then explores processes within cells; namely respiration and photosynthesis. Respiration has been foregrounded earlier in the term by studying the body's response to exercise and photosynthesis is built upon from Year 8 Plants topic as well as exploring the structure of plant cells within Cell Biology.	

	How does the KS3 Curriculum build on previous learning at KS2?	**Living things and their habitats** KS2 students can • Understand basic lifecycles and describe developmental changes in humans. • Describe broad classification based upon observable characteristics • Identify structures within circulatory system and recognise impact of diet, exercise, lifestyle on bodily function • Describe how nutrients and water are transported. KS3 students can • Describe the structure and function of the reproductive systems, the process of fertilisation, menstrual cycle and gestation. • Explain classification with reference to Linnaeus • Explain the organisational hierarchy of multiple systems within the human body. • Explain the entire process of digestion, including absorption and transport of water and nutrients. **Evolution and inheritance** KS2 students can • Recognise living things have changed over time and the uses of fossils. • Recognise living things produce variation in offspring • Identify how animals and plants are adapted to suit their environment and that this may lead to evolution KS3 students can • Explain the process of natural selection occurring over vast time scales and understand the importance of variation. • Understand the reproductive process and sources of variation, including both inherited and environmental • Explain adaptations of organisms, including dispersal in plants	