Curriculum Overview

BIOLOGY

At James Calvert Spence College, we provide a broad and balanced, ambitious curriculum for all pupils. Our biology curriculum builds upon the knowledge and skills pupils have developed in first school through a well-planned and sequenced curriculum. Our curriculum plans follow the National Curriculum as well as drawing upon best practice within the field of biology. We draw on evidence-based research to ensure our curriculum is high quality and meets the needs of our pupils. We provide regular opportunities to revisit learning, so it becomes embedded in our pupils' long-term memory. Disciplinary knowledge such as scientific skills, data analysis and practical opportunities, are embedded within the topics covered. The overview of our plan is below.

***Important note:** Due to some teaching groups being shared between two or three science teachers, the order in which topics are taught may vary slightly between classes. Rest assured, all students will receive full coverage of the curriculum within the academic year.

Assessment: Assessments are provided in line with the school's assessment schedule and written feedback is calendared for pupils. We also provide live feedback as described below.						
Year	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
7*	**Scientific skills** Pupils will be given the opportunity to develop their scientific skills at the start of year 7. They will be introduced to laboratory safety including risks and hazards and will gain experience in using appropriate apparatus, set up and use a Bunsen burner. Pupils will deepen their knowledge of asking scientific questions, identifying and choosing appropriate variables, and plan their own investigations. **Cells** In this topic, students are introduced to the		**Our Healthy Body** In this topic, students explore how the human body functions to keep us healthy. They learn about the structure and function of key body systems, including the digestive system, circulatory system, and respiratory system. Students investigate the role of nutrients in a balanced diet, how food is broken down and absorbed, and how oxygen and nutrients are transported around the body. The topic also covers the effects of lifestyle choices such as diet, exercise, smoking, and alcohol on health. Through practical investigations and data		**Reproduction** In this topic, students learn about the processes of reproduction in humans, animals, and plants. They explore the structure and function of the male and female reproductive systems and understand how fertilisation leads to the development of a new life. The stages of pregnancy and birth are studied, including how a fetus develops and is supported. Students also learn about puberty and the physical and emotional changes it brings. The topic includes an introduction to reproduction in flowering plants, covering pollination, fertilisation, seed	

	building blocks of life: cells. They learn how microscopes are used to observe cells and practise preparing slides to view specimens. Students explore the structure and function of plant and animal cells, identifying key organelles and understanding their roles. They learn how cells are specialised to perform different functions and how they are organised into tissues, organs, and systems. The topic also introduces the concept of unicellular organisms. Practical work develops microscope skills, observational drawing, and scientific vocabulary, while reinforcing the importance of accuracy and safety in scientific investigations.	analysis, students develop their understanding of how science supports healthy living and informs public health decisions.	formation, and germination. This topic helps students build a respectful and scientific understanding of human biology and life cycles.
8*	**Respiration and photosynthesis** In this topic, students explore the two key biological processes that provide energy for life: respiration and photosynthesis. They learn how respiration occurs in all living cells to release energy from glucose, comparing aerobic and anaerobic respiration and understanding their roles in different organisms and activities. Students also study how plants use photosynthesis to make their own food, identifying the reactants, products, and the importance of chlorophyll and sunlight. The topic covers how the structure of leaves supports photosynthesis and how factors such as light, carbon dioxide, and temperature affect the rate of this process. Students carry out practical investigations to develop their skills in planning, measuring, and interpreting data, while deepening their understanding of how energy flows through living systems.	**Inheritance** In this topic, students explore how characteristics are passed from one generation to the next through the process of inheritance. They learn about the role of DNA, genes, and chromosomes in determining inherited traits, and how variation occurs within a species. Students investigate the difference between inherited and environmental characteristics, and how these contribute to an organism's features. The topic introduces simple genetic crosses and dominant and recessive alleles using examples such as eye colour and inherited conditions. Students also examine how selective breeding and natural selection influence evolution over time. Through this topic, students develop an understanding of genetic diversity and its importance in adaptation and survival.	**Ecology** In this topic, students explore the relationships between living organisms and their environments. They learn how ecosystems are structured, including the roles of producers, consumers, and decomposers in food chains and food webs. Students investigate how energy is transferred through ecosystems and the impact of environmental changes on populations. Key ecological terms such as habitat, community, population, and biodiversity are introduced, alongside the importance of interdependence and competition. The topic also covers adaptations of organisms to their environments and how human activities—such as pollution, habitat destruction, and climate change—can disrupt ecosystems. Students develop fieldwork and data interpretation skills, fostering an appreciation for environmental conservation and sustainability.
9	**Cell Structure and Transport** In this topic, students build on their knowledge of cells by exploring detailed cell structures and the processes of transport across cell membranes. They study the differences between prokaryotic	**Heart and the Circulatory System** In this topic, students examine the structure and function of the human heart and the circulatory system. They learn how the heart pumps blood around the body through a network of blood	**Ecology** In this topic, students investigate the complex interactions between organisms and their environments. They study ecosystems, including biotic and abiotic factors, and explore energy

	and eukaryotic cells and identify the functions of organelles such as the nucleus, mitochondria, ribosomes, and chloroplasts. The topic covers key transport mechanisms including diffusion, osmosis, and active transport, explaining how substances move into and out of cells to maintain homeostasis. Students develop practical skills through microscopy, modelling, and experiments that investigate factors affecting the rate of diffusion and osmosis. This topic deepens students' understanding of cell biology and the vital processes that sustain life. **Organisation and Digestion** In this topic, students explore the organisation of living organisms from cells to tissues, organs, and organ systems, focusing on the human digestive system. They learn about the structure and function of key digestive organs, including the mouth, stomach, intestines, liver, and pancreas. Students study the processes of digestion and absorption, examining how enzymes break down carbohydrates, proteins, and fats into smaller molecules that the body can use. The topic also covers the importance of a balanced diet and the role of nutrients in maintaining health. Practical investigations help students understand enzyme activity and the efficiency of digestion under different conditions, enhancing their appreciation of biological organisation and human physiology.	vessels, delivering oxygen and nutrients to cells and removing waste products. The topic covers the components of blood, including red blood cells, white blood cells, platelets, and plasma, and their roles in transport and immunity. Students explore the double circulatory system and understand the relationship between heart rate, exercise, and health. Through practical activities and data analysis, students develop an understanding of cardiovascular health, disease prevention, and the impact of lifestyle factors on the circulatory system.	flow through food chains, food webs, and trophic levels. Students examine population dynamics, factors affecting biodiversity, and the importance of conservation. The topic also addresses human impacts on ecosystems, such as pollution, habitat destruction, and climate change, and considers strategies for sustainable management of natural resources. Practical work includes field investigations, data collection, and analysis, helping students develop skills in scientific inquiry and environmental stewardship.
10	**Combined Science** **Cell biology** Building upon the knowledge on human biology gained throughout key stage 2 and 3, the pupils will begin to look at more complex concepts such as cell structure and specialisation, microscopy, mitosis, cell transport.	**Combined Science** **Organisation and the digestive system (continued) and plants** Prior learning from key stage 3 will be revisited with pupils reviewing organisation of cells, and specific reference to the digestive system, the heart and the lungs. Pupils will then apply knowledge of the organs to how features allow	**Combined Science** **Health and lifestyle and disease (continued)** During term 1 pupils were introduced to cell structure. During this unit, pupils will use prior knowledge and apply it to their study of disease and how it is prevented including vaccination and immunisation. They will be introduced to the terms communicable and noncommunicable to

	Organisation and the digestive system Prior learning from key stage 3 will be revisited with pupils reviewing organisation of cells, and specific reference to the digestive system, the heart and the lungs. Pupils will then apply knowledge of the organs to how features allow for gas exchange in animals and plants.	for gas exchange in animals and plants. **Health and lifestyle and disease** During term 1 pupils were introduced to cell structure. During this unit, pupils will use prior knowledge and apply it to their study of disease and how it is prevented including vaccination and immunisation. They will be introduced to the terms communicable and noncommunicable to categorise different diseases, as well as investigating ways of both preventing and treating disease.	categorise different diseases, as well as investigating ways of both preventing and treating disease.
10	**Separate science** **Cell biology** Building upon the knowledge on human biology gained throughout key stage 2 and 3, the pupils will begin to look at more complex concepts such as cell structure and specialisation, microscopy, mitosis, cell transport. **Organisation and the digestive system and plants** Prior learning from key stage 3 will be revisited with pupils reviewing organisation of cells, and specific reference to the digestive system, the heart and the lungs. Pupils will then apply knowledge of the organs to how features allow for gas exchange in animals and plants. Practical skills will be developed through the investigation of cells, osmosis and enzymes.	**Separate science** **Organisation and the digestive system and plants (continued)** Prior learning from key stage 3 will be revisited with pupils reviewing organisation of cells, and specific reference to the digestive system, the heart and the lungs. Pupils will then apply knowledge of the organs to how features allow for gas exchange in animals and plants **Health and lifestyle and disease** During term 1 pupils were introduced to cell structure. During this unit, pupils will use prior knowledge and apply it to their study of disease and how it is prevented including vaccination and immunisation. They will be introduced to the terms communicable and noncommunicable to categorise different diseases, as well as investigating ways of both preventing and treating disease. A practical investigation will investigate the effect of antimicrobial substances.	**Separate science** **Photosynthesis** During term 1 and 2 pupils were introduced to tissues and organ structure in plants and animals. They will use this knowledge and apply it to their study of photosynthesis and respiration. Pupils will develop their practical skills by investigating the effect of light on photosynthesis.
11	**Combined Science** **Bioenergetics** During term 1 and 2 pupils were introduced to	**Combined Science** **Homeostasis and response**	**Combined Science** **Inheritance, variation and evolution** Continued.

	tissues and organ structure in plants and animals. They will use this knowledge and apply it to their study of photosynthesis and respiration. Pupils will develop their practical skills by investigating the effect of light on photosynthesis. **Homeostasis and response** During term 1 pupils are reintroduced to concepts of photosynthesis and respiration to give pupils opportunity to retrieve key concepts taught at the end of year 10. During the homeostasis and the nervous system unit, pupils will apply knowledge of organ systems in humans, and how systems are controlled in the body, as well as being introduced to new knowledge of reflexes and reactions.	Continued. **Inheritance, variation and evolution** Pupils will build upon knowledge from key stage 3 on reproduction, variation and evolution to study sexual and asexual reproduction, DNA and inheritance. They will then deepen their understanding of natural selection and learn the methods and ethics of selective breeding and genetic engineering.	**Ecology** Pupils will be given the opportunity to deepen their understanding of ecosystems, and explore the relationship between biotic and abiotic factors, communities and adaptations, cycling materials, and biodiversity, as well as global warming, which is taught in both chemistry and physics. **Preparation for external examinations**
11	**Separate science** **Homeostasis and response** During the homeostasis and the nervous system unit, pupils will apply knowledge of organ systems in humans, and how systems are controlled in the body, by investigating reflexes and reactions and the structure and function of the eye and the brain.	**Separate science** **Inheritance, variation and evolution** During term 2, pupils will build upon knowledge from key stage 3 on reproduction and cell division to study sexual and asexual reproduction, then progress to DNA, protein synthesis and inheritance. Pupils will then build upon knowledge from key stage 3 on variation and evolution to enhance their knowledge on natural selection, speciation, and learn the methods and ethics of selective breeding and genetic engineering. Pupils will learn about the history of genetics, including the key scientists and then further their understanding of fossils, extinction and learn of the importance of preventing antibiotic resistance.	**Separate science** **Inheritance, variation and evolution** Continued. **Ecology** Practical skills will be improved in term 3 through investigations into field sampling and decay, with mathematical skills being used to analyse results. Pupils will deepen their knowledge of ecosystems, and explore the relationship between biotic and abiotic factors, communities and adaptations, cycling materials, and biodiversity, as well as global warming, which links both to chemistry and physics. **Preparation for external examinations**

Examples of on-going assessment and feedback in lessons
● Verbal feedback by the teacher to the whole class which pupils act on in the lesson; this is often evidenced using green pen. ● Pupils self-assess or peer-assess work with a clear framework guiding them through this. ● Teachers circulate to give 'LIVE' and immediate feedback as pupils are working independently. ● Pupils may complete mini quizzes or retrieval activities that revisit prior learning and receive verbal feedback. ● Use of tailored questioning by the teacher.