KS3 Curriculum Overview

Biology

Curriculum Intent

Our ambition is for all students to understand Biology as the science of life, based on cells and able to explain many significant processes in living things. Students who are able to effectively propose and investigate a hypothesis are scientists by definition. Through investigation students learn how to make sense of the natural world. They are able to marvel at the beauty of nature and the elegance of its laws and apply this understanding to solve real world problems.

By the end of Year 9, we want students to be able to 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.

How does the KS3 curriculum build on that from KS2?

The priority at KS2 is to gain an understanding of how to undergo a scientific investigation and by consideration of macroscopic observation (e.g. classifying rocks, classifying living things, investigating magnetism). In Y7 especially, we reinforce these ideas and then push students beyond KS2 by considering how microscopic (in biology) or nanoscopic (in chemistry and physics) processes act as drivers for the macroscopic observations

What do students *do* with this knowledge or these skills?

We are increasingly looking for students to be able to carry out full scientific investigations. Over time students should increasingly be able to:

- propose a hypothesis
- design an experiment
- select suitable apparatus
- identify a variable to change, measure and explain how all others will be controlled
- select a suitable method to record and present data and any relationships therein, followed by a sensible conclusion
- write an honest evaluation of the validity of the method and the reliability of the data

How does the KS3 curriculum align to the National Curriculum?

Whilst students will have been taught science at Primary school, we want to introduce them to the subject as specialists. Students should appreciate the three distinct but complementary disciplines: Biology – we study the building blocks of all living things –cells and processes they are involved in. In Year y students learn are introduced to cells and their components, in 8 students should focus on how cells work in union to enable body systems to be effective. They need to appreciate how vital plants are to life on Earth. In Year 9 students complete KS3 by linking together all the human processes they have studied to seem how cells, tissues and organs allow the body to work so well

What new knowledge or skills are students taught?			
Term	**Year 7**	**Year 8**	**Year 9**
Autumn	Cells • Cells are much too small to be seen with the naked eye. We need to use a special piece of scientific equipment, the microscope to be able to see them. • Multicellular organisms are made of cells, which are organised into tissues, organs and systems to carry out life processes. • There are many different types of cell. Each has a different structure or feature so it can do a specific job.	Nutrition & digestion • The body needs a balanced diet with carbohydrates, lipids (fats), proteins, vitamins, minerals, dietary fibre and water from its cells' energy, growth and maintenance. • Organs of the digestive system are adapted to break large food molecules into smaller ones which can travel in the blood to cells and are used for life processes	Human health • Identify the structures of the skeleton and associated functions in humans and other organisms. • Describe and explain the function of the human heart. • Relate the structure of blood vessels to their functions. • List components of blood and explain their function. • Describe and explain how the human body responds to exercise • Describing risk factors for coronary heart disease, and explain some treatments
Spring	Reproduction & variation • There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment, and some is a combination. • Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. • The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances	Microbes & disease • There are different types of pathogens that can cause diseases; fungi, bacteria, viruses and examples of diseases caused by these. • Understanding methods of disease transmission, ideas of how we can prevent infection and looking at examples of pandemics. • Our immune system is made of multiple components from white blood cells to antibodies which work together to keep us healthy and prevent infection.	Cells • The structure of cells as seen under the light microscope and electron microscope and how to calculate magnification. • The similarities and differences between prokaryotic cells and eukaryotic cells and orders of magnitude. • How cells divide by the process of mitosis, during the cell cycle, to bring about growth and repair of tissues. • The role of diffusion in the movement of materials in and between cells. • The roles of osmosis and active transport in the movement of materials in and between cells.
Summer	Ecology • Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. • The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. • Plants have adaptations to disperse seeds using wind, water or animals.	Plants • Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. • They either use the glucose as an energy source, to build new tissue or store it for later use. • Plants have specially adapted organs that allow them to obtain resources needed for photosynthesis	Organisation • Multicellular organisms are made of cells, tissues, organs and organ systems. • Structure of enzymes is related to their function and how enzymes are involved in the process of digestion. • To function effectively the human gas exchange system requires the lungs to have a large surface area:volume ratio. The alveoli of the lungs are adapted to allow effective gas exchange. • The role of the stomata in plant gas exchange and how evaporation and transpiration are controlled in plants.
Rationale for this sequencing	Students's curriculum knowledge builds in breadth and depth as they progress through KS3 science. Each term and topic focussing on key threads through the three sciences; biology chemistry and physics. There is also a core focus throughout the curriculum on developing key practical skills to become young scientists.		

Additional support at home	
Additional reading for enjoyment, enhancement and extension	• The science of Harry Potter by Mark Brake
Online resources to practice, consolidate and revise	• BBC Bitesize • Kay Science
Workbooks & revision guides to practice, consolidate and revise	• Higher: KS3 Study Guide • Foundation: KS3 Study Guide

EASTERN LEARNING ALLIANCE