Year 8

Due to the school closure period resulting in a shortened year 7 curriculum, the year 8 curriculum has been temporarily restructured to account for specific fundamental topics that were not covered in year 7. As a result, some of the extension topics in year 8 (*Lost Worlds & Temperature)* have been missed whereas other topics have been moved to year 9 (*i.e. Plants & Photosynthesis & Motion)*

We have prioritised some topics over others based on:

1. Their value going forward so students can engage successfully in GCSE science and beyond
2. The practical experience they offer as year 8 students did not carry out physical practicals last year (only digital practicals) on account of not being taught in labs.

The rationale for each topic taught can be found in the overview for year 7 & 8

Autumn Term	**Nutrition & Digestion**	**From Year 7**
	Magnetism	
	Waves (Light & Sound)	
Spring Term	**Particles**	**From Year 7**
	Microbes	
	The Earth	
	Respiration	
	Separation Techniques	**Previously Named: Solutions**
Summer Term	**Evolution**	**From Year 7**
	Atoms & the Periodic Table	
	Heating & Cooling	

Please note*: The overview below relates to a curriculum that is currently in development. There is overlap between the curriculum being taught currently and the one outlined below but there will be some variation this year.*

Autumn Term

In year 8 **biology** we build on the key concept of **cells** as we explore **microbes and disease**. Every student implicitly understands what it feels like to be ill and the comfort associated with medical intervention. The accessibility is high but so is the challenge. We start by engaging students with historic medical interventions before **microscopy** shed light on the cause of **communicable diseases**. We then look at how **microscopes** revealed the structural difference between **animal cells** and

pathogenic cells. We build upon our knowledge of **organ systems** by exploring the complexities of the human **immune system** before looking at the need for medical interventions such as **vaccinations** and **antibiotics**. We also learn how some diseases are **non-communicable** and depend on our lifestyle such as **nutritional** choices.

In **chemistry**, having developed an understanding of **particles** in the form of **atoms** and **molecules**, we now learn how, often in nature, useful particles are found in **mixtures,** such as **solutions,** that require **separation techniques.** This unit continues to develop student's practical problem solving skills as they learn how to exploit the **chemical** and **physical properties** of different types of **matter** by choosing the appropriate **separation technique**. Students will learn the wider significance of such techniques which give humans access to many commercially viable products which many economies depend on.

In **physics** we contextualise and build upon their prior learning of **forces** by looking at how forces interact with **matter** to bring about **motion**. Whether we are observing a sprinter, a rocket launch or planetary motion in a star system, we can only understand such phenomena by the forces that govern their motion. We develop student's mathematical processing by using equations and graphs to describe the motion of objects for no other reason than it is often the easiest way to describe such events and we want to encourage students to have a positive relationship with maths in science, not be intimidated by it. Students will also develop practical models to collect data on an object's motion to give them further practise in developing their methodical thinking skills and how to take precise measurements.

Now having had an introduction to the key principle of **energy**, we turn our focus to the **grand idea** of **temperature**. All students can relate to this topic as they experience daily fluctuations in their **body temperature** affecting their level of comfort as a **constant body temperature** is essential for the **survival** of **warm-blooded organisms**. We can also use this as a vehicle to develop their use of **thermometers** to take accurate measurements and why that is important in a range of situations such as monitoring a fever, initiating a chemical reaction or a number of culinary processes. A knowledge of planetary **temperature** fluctuations is essential for understanding **global warming** as well as our ongoing quest to find **life** on other **planets.** With the **climate change** crisis and limited supply of **fossil fuels**, we want to develop their understanding of the importance of limiting **heat loss** at home. We will unpick common misconceptions about the nature of **conductors** and **insulators** in that **insulators** keep things cool as well as hot and this governs **material choices** for the products we make. We will also learn the difference between **heat** and **temperature** in terms of **particles** and that cold is merely an absence of heat. Students will also learn how heat can be transmitted through **particles** and as **infrared waves**.

Spring Term

In year 7 students learned about **plant cells**, **food chains** and the **life processes** that all living things carry out. '**Plants'** is as an excellent topic to review and extend these concepts. Students will learn about how these **organisms** are hugely **varied** and have **evolved** a wide range of strategies to overcome all the same problems animals face but with the additional challenge of being immobile. Students will make links between the **chemical process** of **photosynthesis**, where plants convert **light energy** from **nuclear reactions** in our **sun,** to the **molecules** and **compounds** that they use and produce that support almost all **life** on earth as well as determine the composition of our modern **atmosphere**. We will consider **reproduction** from a plants perspective and how poor quality soils

have led to the evolution of **carnivorous plants** - a topic that is usually overlooked in science curriculums but is hugely popular with students and develops their understanding of the importance of **soil fertility** which is an increasingly concerning global issue.

In chemistry, having understood how chemical reactions involve different types of atoms bonding together, we now open up the chemist's toolbox: the **periodic table.** The periodic table is the most significant development in chemistry as it forms a complete archive of all discovered elements so becomes our reference point for understanding **chemical patterns** and **properties**. While year 7 had a more limited and selected view on chemical reactions, the periodic table opens up vastly more possibilities. We will learn about its **organisation**, its **development** and how we use it to determine the **atomic structure** of an **element's atom**. The periodic table is vitally important going forward as many future chemistry concepts can be brought back to the organisation of the periodic table. In this topic we will also start thinking about **balanced chemical symbol equations** and their relation to **conservation of mass** learnt in year 7.

In physics, we now look at **magnetism**. Having learned about **electricity** and **forces**, we focus on the **magnetic force** and how it is intimately linked to **electricity** through the concept of **electromagnetism**. Magnets are objects that offer students endless fascination but here we significantly develop their understanding by showing how magnetism plays a key role in our **Earth's structure,** in **generating electrical power**, in **motor powered devices** and many other inventions that define our modern lifestyle. There are even links to the natural world as we consider how **organisms** use the **Earth's magnetic field** for navigation.

The next biological **grand ideas** is that of **lost worlds**. One of the most frequently requested topics of interest by our students has been **dinosaurs** so, as a department, we asked how can we make this relevant to our curriculum. In lost worlds we consider how **organisms** inhabit our planet for a limited period of time. We consider how an ever-changing environment places populations under pressure ultimately resulting in their **extinction**. This topic aims to develop prior knowledge of **evolution** but from a different perspective – *what happens when organisms cannot adapt to their environment***?** This topic also serves as a vehicle to teach our students about how scientists collect evidence in the form of **fossils**, **DNA analysis** and examining layers of **rock** that make our **earth's crust**. We also consider the effect of high impact collisions between **asteroids** and our planet. We consider how we are the only surviving human **species** linking back to **classification** last year. We also consider how early humans switched from a **hunter-gatherer lifestyle** to **farming** which led to the **artificial evolution** of organisms through **selective breeding** forever changing our relationship with our planet Earth.

Summer Term

In chemistry students extend their learning of **acids and bases** as well as chemical reactions, by looking at **metals and acids.** This is another highly practical topic where we look at one of the most useful family of **chemical reactions** – **metals** and **metal compounds (bases)** with **acids** to make **salts** (which have many commercial uses which we explore further in year 9). Students, having learned more about **chemical formulae** from the **periodic table**, are now in a good position to continue practising **balanced symbol equations** – a critical part of their GCSE assessment so early practise is hugely beneficial.

In biology we learn about **respiration**. Having learnt about nutrition we focus on one aspect – **energy from food**. All organisms need to supply themselves with **energy** and this is done through the process of **respiration**. This is a fundamental topic that plays a big part of their GCSE curriculum. It is a natural extension of **life processes** and **nutrition** but also allows students to consider the roles of specific **organ systems** taught in year 7: the **circulatory system** and **respiratory system** in facilitating the **chemical reaction** that is **respiration.**

In physics, the topic **waves** makes links to so many other topics (**energy**, **photosynthesis**, **climate change**, **earthquakes**, **space and radiation**, **heating and cooling**) that it is important that we develop their understanding of the fundamentals early on. It is the final core abstract principle in physics. Although it has been referenced in other topics we now give shape to what a physicist means by '*waves*'. Students will develop their understanding of waves through the concept of **light** and **sound**, initially referenced in the year 7 **energy** topic. The key focus is on how the **frequency** and **wavelength** of waves affects how they interact with **matter** and **living organisms**.

The final **grand idea**, linked to chemistry, is **the Earth**. Having learnt about the significance of one **chemical sphere** in year 7 (the **atmosphere**) we now focus on another **chemical sphere** – the **lithosphere** so students gain a better understanding of the behaviour of the planet they live on. We learn about the **physical process** that drive the **rock cycle** and the layers of earth that contain evidence about our Earth's history, which links with **lost worlds** and **fossils**. Having an understanding of the planet we live on and being able to relate it to phenomena we witness, be it **earthquakes** on the news or **coastal erosion**, is an essential learning experience. Learning about planet Earth also gives us insight into the conditions on other planets as all planets have condensed from clouds of matter scattered by **the big bang**.