Year 9

Due to the school closure period resulting in a shortened year 7 & 8 curriculum, the year 9 curriculum has been temporarily restructured to account for specific fundamental topics that were not covered in year 7 & 8. As a result, some topics have been shortened (*i.e. 'Salts' will focus on patterns of reactivity)* Due to the restructuring of year 7, some topics that were previously covered in year 9 can now be found in the year 7 curriculum overview.

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 9 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 overviews for year 7 & 8

Autumn Term	**Electricity**	**From Year 7**
	Space	
	Inheritance	
	Climate Change	**From Year 7 - Previously called 'Environmental Chemistry'**
Spring Term	**Reactions of Metals**	
	Motion	**From Year 8 - Previously called 'Speed'**
	Salts	**Previously called 'Patterns of Reactivity'.**
	Tomorrow's World	**Previously called 'Using Chemistry'**

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 9 we are very conscious about maintaining high levels of engagement and challenge so students enter their GCSEs with secure knowledge, motivation and purpose.

Having developed a deep understanding of biology on a macroscopic level through **interdependence** and **evolution** in year 7 and the **evidence** supporting **evolution** in year 8, we are now ready to reduce our understanding to the **microscopic cellular level** once more as we consider how **molecules** of **DNA** are passed between organisms through **reproduction** in the topic **inheritance**. Essentially this is about the **genetic** mechanisms underpinning **variation** and **evolution**. We teach this as it serves as an suitably engaging precursor to the GCSE curriculum. Students are always fascinated by the differences that exist between them so now we examine one core aspect of why. We will review **asexual** and **sexual reproduction** and then learn how sexual reproduction is a source of huge levels of **variation** when we consider **genetic crosses**. We will examine **DNA** as a molecule in more detail and learn about its **discovery** as it provides insight into the working world of a scientist. We will then look at the present and future as we consider how

manipulating the **genes** of an **organism** through **genetic engineering** can serve humanity - and naturally consider the **ethics** of such practises.

In chemistry we unite and extend our prior learning of **particles**, **chemical reactions, metals** and **acids** as we look at **salts**. Students will learn the importance of **salts** as a highly valuable family of chemicals. Here we revisit **atomic structure** and learn how **atoms** can form charged structures called **ions.** We develop this by looking at how **ions bond** to form **salts** as well as examine how **patterns of reactivity** enable us to predict what **salts** are **formed**. We will consider how the **particle arrangement** of **salts** determines their **properties**. We will review **balancing symbol equations** as we continue to embed this core essential skill.

The next **grand idea** in chemistry is **tomorrow's world.** We build on the theme of how **particle arrangement** affects the **properties** of **matter** and how we use materials. We examine the latest developments in matter by looking at **smart materials** and **nanotechnology** and how these materials are solving problems to shape our future.

Physics....

Spring Term

Our next biological **grand idea** is **intelligence.** So many students choose psychology as a college subject that we felt it important to shed light on this overlooked field of science. It is also a platform where we can continue the development of core ideas such as **cells** and **organ systems** as we examine the **neurone** and **nervous system**. We consider the difference between **simple** and **complex intelligent behaviour** and why both have **evolved**. We consider **disease** once more, but in terms of **dementia**. We also revisit **medical intervention** but now in terms of how **drugs** affect our **brain**. We also learn about some of the core principles of psychology such as **conditioning**, **imprinting** and **learning** so students better understand animal behaviour. An understanding of how we learn also sets up a healthy mindset for the next stage of their academia.

In physics we explore the **grand idea** that is **space travel**. As well as being an engaging topic, space travel presents us with many problems that physicists need to overcome and considering such problems links and extends prior learning in a meaningful way. We will consider **forces, acceleration** and **gravity** as we learn about how we launch objects into **space**. We will examine how surviving the hostile conditions of space require knowledge of **fluid pressure**, **temperature, forces, energy** and **waves,.** The focus of this topic is problem-solving using physics so students understand its unquestionable importance prior to their GCSEs. We will also learn about **stars** as **fusion reactors** that create the **elements** that **matter** is composed of and how we know so much about the observable **universe** through decoding the information transmitted by starlight. This extends draws on the previous grand ideas of the **Big Bang** and **temperature** as we consider **star lifecycles.**

GCSE BEGINS

Spring Term - Second Half

Students begin the course by revisiting cells as the fundamental building block of life. Their knowledge is extended by developing their understanding of the function of the sub-cellular structures common and unique to animal, plant and prokaryotic cells. Students further develop their skills in microscopy through understanding the importance of using stains to observe specific cell structures and using mathematical processing to work through magnification calculations. Unit conversions are an integral part of this process as students learn how to convert from millimetres to micrometers, nanometres and picometres so that they truly grasp the scale of what microbiologists work with when they observe the ultrastructure of the cell.

Students will then develop their understanding of the importance of enzymes in life processes, a core biological concept. At KS3 they learned about the digestive role of enzymes. Here, they broaden their knowledge by learning how enzymes are involved in all biochemical reactions that take place in living organisms. This will involve practical work that develops their understanding of the sensitivity of enzymes to specific biological factors, such as body temperature and pH, so that enzymes can operate at a rate that sustains life.

The final core concept students learn in biology is the role of transport in cells. At KS3 students learned about how transport of water, oxygen, carbon dioxide and glucose are essential for the energy-providing process of respiration. Now they learn the specifics of how these chemicals and others are transported into and out of cells so that cells acquire necessary chemicals and remove the waste they produce. This is achieved through three mechanisms: diffusion, active transport and osmosis.

In chemistry students revisit the key idea of particles in states of matter. Their knowledge is extended through learning about the forces of attraction that hold particles together and the role of energy in overcoming these forces and bringing about changes of state. Students will also study and experiment with the use of separation techniques, such as chromatography, filtration and distillation, as they are vital for industrial processes that yield products of great commercial value and analytical processes that help us identify unknown chemicals.

Summer term

Chemistry continues with the core theme of particles and draws on the knowledge of atoms and elements from KS3 but now extends this to include how atomic structure is linked to the periodic relationships in the physical and chemical properties of the elements. Students also learn about the fascinating history of the periodic table: the definitive catalogue of all known elements that helped shape our understanding of chemistry, and key experiments that helped scientists to determine the structure of the atom so they understand how scientific ideas change in light of new evidence.

In physics students build on their knowledge of light and colour and are introduced to the electromagnetic spectrum. They will learn about how the visible light we perceive only represents a small proportion of the light emitted in the universe (the electromagnetic spectrum) and how our knowledge of other types of light has helped us develop communication technology that defines our modern lifestyle as well as understanding the cause of life-threatening conditions such as cancer. Students will understand the essential link between the frequency and wavelength of different radiations that make up the EM spectrum and how knowledge of this has helped enhance our lives.

Finally students will extend their knowledge of the prokaryotic (bacteria) kingdom and their interaction with other organisms as they learn about health and disease. This module will examine the cause of infection and how our body develops immunity to harmful pathogens as well as learning about the need for further medical intervention in the form of antibiotics and vaccines. Students will compare communicable diseases with non-communicable diseases related to our lifestyle choices such as the impact recreational drugs use or an unhealthy diet can have on our health.