Science has changed our lives and is vital to the world's future prosperity. All pupils are taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils are encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

Science is a motivating and inspiring journey of investigation and discovery, which we make as 'hands on', fun and relevant as possible. We believe the skills learnt in science are key to enabling our students to understand, analyse and evaluate the complex world around them.

Biology is the science of living organisms (including animals, plants, fungi and microorganisms) and their interactions with each other and the environment. The study of biology involves collecting and interpreting information about the natural world to identify patterns and relate possible cause and effect. Biology is used to help us improve our own lives and to understand the world around us.

The Big Ideas we link through our biology curriculum are:

- Cells & Cellular Processes - The structure and functioning of cells is vital to understanding how living organisms survive. The cellular processes within living organisms form fundamental descriptions of how these organisms survive.
- Biological systems for life - Biological systems provide with the vital knowledge to look at the organism as a whole and be able to understand how one functions to ensure survival on a daily basis as well as for the species.
- Organisms and their interactions with the environment - Organisms do not live in isolation. All are linked and interdependent on others whether it is producers or their own predators. To understand these interactions enables us to think about our own impact on the world we live in.

Chemistry is the science of the composition, structure, properties and reactions of matter, understood in terms of atoms, atomic particles and the way they are arranged and link together. It is concerned with the synthesis, formulation, analysis and characteristic properties of substances and materials of all kinds.

The Big Ideas we link through our chemistry curriculum are:

- Materials and their properties - Different things surround us, it is vital that we understand where they have come from and what we can do with them. Understanding elements and their properties enables us to understand how things work as well as using that knowledge to make substances that can be used in the future.
- Chemical changes - Chemicals provide us with so many reactions and resources that to understand those means we can understand our own impact on the Earth as well as how to ensure we preserve it for the future.
- Our Earth and its atmosphere - "We do not inherit the Earth from our ancestors, we borrow it from our children" and this section helps us to understand how true this is and how Chemistry can help us ensure this is the case.

Physics is about understanding the world around us from the tiniest particle imaginable to the staggering enormity of the Universe. Physics uses the latest and the most advanced technology to probe the mysteries of the sub-atomic, quantum world and the most distant detectable astronomical phenomena. Physics uses mathematics and models as well as practical experimentation to study the behaviour of matter, energy, waves, forces and fields.

The Big Ideas we link through our physics curriculum are:

- Energy - Energy can be transferred and stored, but never created or destroyed. Nothing can happen without a transfer of energy. By better understanding how energy works we can better understand our lives. Energy usage issues are at the heart of many issues in industry, finance, politics and the environment
- Forces and fields - Sports, transportation and space exploration are all dependent on our understanding and application of our knowledge of forces and the fields that can be used to make them
- Matter and materials - Our study of matter helps us select, design and utilise materials for all aspects of our lives. Materials can be used to improve our lives by making our vehicles safer and our homes secure, among many other applications

Year 7

The focus in year 7 is to build the knowledge that then feeds into our students' learning journey in Science. Our key topics of cells, acids & alkalis, electricity, atoms, energy, particles and forces are vital to securing this base knowledge. We also support the PSHE programme by delivering sexual reproduction in year 7 and we start to get students thinking about their impact on the environment through ecosystems.

Year 8

We add detail and depth to those Scientific big ideas by taking key points and getting students to focus their understanding in topics on nutrition, combustion, energy transfers, respiration (it's not breathing!), metals and light & sound. We again get students to think about our planet with focusing on those we share it with, through our 'other kingdoms' topic. We begin to develop the curiosity in chemical elements using the Mendeleev and modern periodic tables, which is vital to their further studies in chemistry.

Year 9

To complete the Key stage foundation knowledge, before moving onto GCSE in the second Learning Cycle, we focus on the detail of how we inherit our characteristics and the effect of these on evolution considering Darwin's theory as well as focusing more on the importance of plants to our lives. The periodic table is again used to explain how elements react and how we can use the different materials we make from the elements. Students will investigate forces in more detail, which then leads into the GCSE course for Physics when with Newton's Laws are investigated. The GCSE course is then studied for the remainder of year 9 with biology starting on ecosystems and material cycles as a good introduction to the higher level of knowledge and work required. The Key Concepts are reinforced in Chemistry with the importance of states of matter in how substances behave, the history of the atomic structure starting with Dalton and more on what the periodic table can tell us about elements, explored.

Year 10

The GCSE continues with students having chosen their Combined Science or Separate Sciences route, we follow the Edexcel curriculum as feel this is the best course for our students to achieve their full potential. Throughout the course students have Core practicals to carry out, know and understand as well as maths skills. Our big ideas continue to feature in the topics taught with depth added to our students' knowledge and understanding of cells, inheritance, evolution and how their health can affect them through life. The explanations of how we can make predictions about what elements are going to do when they react is really developed through Chemistry lessons as well as the importance of maths in science to explain reactions. Physics develops the understanding behind waves as well as adding to the electricity topic learnt in year 7.

Year 11

All those concepts developed previously aid students' exploration of the topics in year 11 which add to their understanding of the importance of plants and the coordination of animal responses. As well as making students question much more our role on this planet, Chemistry addresses the effect developments in Science can have on it as well as modern developments, including nanoparticles. Physics uses maths at all points to explain the Scientific phenomena considered and finish the course looking back at forces.

Year 12 & 13

All Sciences at A level have the Big Ideas at their heart with students scrutinizing their understanding of these even further and exploring their own explanations to these important concepts.

In Biology, we follow the Edexcel Salters-Nuffield course, which uses a storyline or contemporary issue to add context to the biological principles. We find this approach really encourages students to develop a greater understanding of different areas of their significance in our changing world. The topics include human biology, genetics, biochemistry, ecology and forensics. Biology is a popular choice with students at QE.

Chemistry has been successful over a number of years with 100% pass rate for the last 15 years. It has a focus on green chemistry, medicinal research and the impact Chemistry can have in the environment with mathematical skills assessed within a chemistry context throughout. Resources for the course a regularly updated and although a difficult subject, it is very rewarding. We have regularly competed in the International Chemistry Olympiad and University of Cambridge Chemistry Challenge with notable successes through the years.

If you're looking for a course to stretch and challenge you, then A level Physics could be for you. Alongside more familiar content like forces, electricity and waves, the course will take you further into modern physics studying quark interactions and quantum effects. You move from thinking about what happens to explaining why, so this is a highly mathematical course too. Resources, like Isaac Physics from the University of Cambridge are used and previous students have even gone on to work at Cern and in Hawaii.

In addition, we offer Psychology in our Science department with it being one of the most popular subject choices at A level here at QE. It is the scientific study of mind and

behaviour so essentially why do people do what they do. Questions considered range form: what causes a phobia to develop and how can psychological techniques be used to treat it? To What do prison inmates and school students have in common? Schizophrenia, addictions and relationships also prove to be popular units with students. Psychology uses scientific theory alongside analytical, mathematical and research skills to develop your understanding and evaluative essay techniques.