Oasis Sholing Science: **Vision**

At Oasis Sholing we have a shared vision to:

1. **Build deep scientific understanding**
2. **Develop character, competence and community of our students and staff**
3. **Ensure Outstanding Outcomes for all**

Our Curriculum

We have structured our curriculum around the most significant concepts in science and mapped students development of these concepts through lesson sequences and topics. To give our curriculum a deeper structure, when designing it, we have thought about how students' knowledge of those concepts enables them to answer our "big questions" in greater depth. This enables our teachers to think about both deepening students' knowledge of concepts and developing meaningful connections between those key concepts. Our big questions have been developed from the ASE and Royal Societies project and are closely linked to the idea of the "big ideas" of science.

Biology	**Chemistry** (& Earth Science)	**Physics**
• What are living things made of? • How do organisms grow and reproduce? • Why do organisms depend on each other and their environment? • Why are living things so diverse? • What keeps organisms healthy?	• What are substances? • What gives substances their properties? • What is chemical change? • How does chemistry affect the earth? • What is the Earth made of and how is it changing?	• What is matter? • Why do things move and change? • How does information and energy spread? • What is electricity and magnetism? • Where are we in space?

Our Science Curriculum will leave students with a deep appreciation of the big ideas of science and an ability to use them to explain the world around them. We will equip our students with the knowledge they need to appreciate the wonder of the universe and the human capacity to make sense of it. Our students will develop a sense of what science is and how scientific knowledge has been developed through prediction, experimentation, and the gathering of evidence. This will give our students the ability to act as 'global citizens', able to grasp the major issues of their generation, and make good choices for themselves, their community, and our planet.

Oasis Sholing Science: **Vision**

Our Vision

1. Build deep understanding

We believe in stretching students understanding of the models and concepts at each key stage as far as is possible, whilst encouraging student practise which applies those models to their experience of the natural world. We believe in making the abstract concrete and maximising students direct experience of the phenomena they are studying. Wherever possible, we relate student practise to real world context and encourage students to make connections between their science curriculum and their experience of the material world.

Our curriculum introduces more complex models once students have embedded a deep knowledge of the more fundamental properties explored at earlier stages. We believe this gives students a deeper understanding of the substantive content and a more developed sense of the disciplinary use of models in highlighting some aspects of a phenomena, whilst neglecting others. This approach enables our KS4 to build upon students, deep understanding of the big ideas at KS3.

All our topics, and sequences within topics, develop via a series of “cognitive steps” based around exposition, checking for understanding and students’ practice. Our topics are sequenced to enable students to build up an increasingly deep understanding of the key concepts in science. We have structured our approach to these big ideas around “big questions” which run through and between topics to build students’ knowledge of concepts both in terms of the detail in which they make sense of them and the links between different concepts.

2. Develop character, competence, and community

We develop **students’ character** through warm teacher – student relationships and a balance of teacher exposition and dialogic discussion. We work to enable students to be joyful at the wonder of the universe and our capacity to understand it, humble about our place within nature and hopeful about society’s capacity to overcome the ecological crisis they have inherited.

We build **student competence** with a curriculum based on stretching students understanding of the big ideas in science. Our students gradually build up a sense of key concepts through being exposed to them in a range of contexts, developing their ability to recognise the power of a small number of ‘big ideas’ to

explain a wide range of phenomena. By doing this we aim to create students who can retain a wealth of scientific knowledge they can use flexibly in and beyond the classroom.

We advance our **students' sense of community** by applying students' knowledge to examples of how humans both change and attempt to understand the natural world. By enabling students to relate their knowledge to these issues, and make sense of the enormity of them, we leave our students with the knowledge and skill they need to understand the issues and a deep sense of hope that science provides us with the potential to change and transform our world for the better. Students develop an awe and wonder for science through our curriculum which is supported by trips, clubs and external visitors.

We develop our **staff's character** through warm professional relationships, a shared belief in our vision, and through a collaborative working environment. We build **staff competence** through developing teachers with deep 'subject knowledge for teaching' and 'pedagogic content knowledge', a culture of coaching and feedback, and a focus on developing the individual. Finally, we grow our **staff's sense of community** by building a strong understanding of our local context, encouraging all to participate and drive improvement, and offering all staff opportunities to reach their professional potential.

3. Achieve outstanding outcomes for all

We believe in all our students and actively support and encourage all to reach their potential. We use the science of learning and cognitive science research to support students to reach their academic potential. This involves focusing on and placing importance on retrieval of core knowledge. We support our students to do this through home-learning and in-class retrieval opportunities. We encourage students to aspire to further academic science studies and make explicit links to future studies in our curriculum. We offer Separate Sciences to all students. We ensure all our students leave with the substantive and disciplinary knowledge needed to make educated decisions about the world around them and play an active role in society.

Oasis Sholing Science: **Vision**

Principles of Progression

Our curriculum is designed to ensure that our students are knowledgeable. Our curriculum is well-sequenced around a series of big questions starting from students' own experience of the world and moving towards a more developed scientific understanding. Over their science education, students will build up their knowledge of the most significant concepts in biology, chemistry, and physics.

Secure Substantive Knowledge: we believe that if students have secure substantive knowledge, they will feel confident in explaining the key scientific principles that govern everything that occurs within our universe. Concepts are revisited throughout their curriculum to ensure that they engage with the most important concepts in a range of applications and contexts.

Experience of phenomena: we feel it is important that students experience many of the phenomena they are studying. The tacit knowledge they gain strengthens and reinforces their declarative knowledge as they move through the curriculum. Experiencing phenomena also provides opportunities for students to challenge the existing models by making and justifying predictions.

Develop Disciplinary Knowledge: we also want to ensure that students have mastered the disciplinary knowledge – they understand and have some experience of what it means to be 'a scientist'. We feel it is important that this is taught alongside the substantive knowledge so that students understand how substantive scientific knowledge has been developed over time.

Investigative and practical skills: structured into our units are opportunities for students to carry out investigative work into the concepts they are studying. Students complete work accurately and precisely in order to develop their procedural knowledge of the scientific method, giving deeper meaning to their understanding and providing students with the foundations to study science at a higher level.

Secure subject specific literacy: We want to ensure that students are equipped with a wide range of scientific vocabulary, an understanding of how scientific ideas are presented and communicated and an opportunity to engage in discussions within the curriculum and at home so that they are able to communicate their ideas effectively.

Oasis Sholing Science: **Vision**

Link the 'Big Questions' in science: over their science education, students will build on this knowledge in order to gain a deeper understanding of the big, overarching ideas in biology, chemistry and physics. From understanding that all material in the universe is made of very small particles, to the concept that energy cannot be created or destroyed to the key ethical arguments governing science; knowledge is constructed and deepened from the foundations up.

Concrete examples and real life contexts: students have the opportunity to practise application of knowledge to meaningful real life contexts so that we ensure it is flexible and that they can apply it to a range of different situations & scenarios both within the classroom and more importantly, their real lives.

Substantive Knowledge:

Our curriculum will equip all students with the substantive knowledge to meaningfully answer our big questions, as well as the disciplinary knowledge to appreciate that our answers are based on the best evidence we have and may be subject to change.

Biology:

- The cell is the basic unit of life from which all organisms emerge.
- Organisms are adapted to survive in their environment.
- Multicellular organisms have complex levels of organisation to maintain the conditions for life.
- Organisms reproduce by passing on their genetic information from one generation to another.
- Organisms compete with and depend on other organisms for the basic materials and energy that cycle through ecosystems. A change to one population, or environmental condition can have a huge impact on biodiversity.
- The diversity of organisms, living and extinct, have evolved by the process of natural selection.
- That biology enables us to study how organisms can stay healthy and how to prevent disease.

Chemistry:

- Objects are made from materials and materials are made from one or more substances built from atoms.
- Chemistry is the study of pure substances with defined chemical and physical properties.

Oasis Sholing Science: **Vision**

- The observable properties of any substance are determined by how its atoms are held together by electrostatic attractions.
- Chemical change is the rearrangement of atoms to make new substances. Chemists study different types of chemical change and how to control the rate and extent of chemical change. All chemical change requires an exchange of energy with the surroundings.
- Chemistry has had a profound impact on our environment. From erosion to climate change, green chemistry is being developed to tackle these challenges.
- Chemistry enables us to understand the structure of the Earth, the minerals it is made from and the substances that make up its atmosphere.

Physics:

- All matter is made of particles. The particle model can be used to explain how matter behaves.
- Forces can be used to explain why things move and change. The idea of energy allows us to predict the extent of change that is possible.
- Energy is always being dissipated into smaller and less useful stores. Waves, including sound, water and electromagnetic waves transfer energy and information.
- The movement of charge forms electrical current and causes magnetic fields. We use electrical currents to power our society.
- We are a tiny planet in a vast universe. All mass in the universe attracts other mass with a gravitational force. We can use the idea of gravity to explain how the universe is changing

Disciplinary Knowledge:

- **Knowledge of methods for answering scientific questions:** a secure knowledge of the different ways that scientists investigate scientific questions so that students will be able to decide on appropriate methods of investigation, enabling them to test predictions and evaluate scientific theories for themselves.
- **Knowledge of apparatus and techniques:** students will have experience of using a range of different pieces of apparatus and techniques. This allows students to decide on the most appropriate scientific methods and equipment, whilst evaluating their use in different scenarios in terms of safety, accuracy, precision, and errors.

Oasis Sholing Science: **Vision**

- **Analyse data:** students should be able to analyse data gathered (or shared with them) using a range of mathematical techniques, tables, and graphs. They should be able to discuss repeatability and reproducibility of findings and potential sources of error and bias. This is so they can discern between fact and error and justify and communicate their conclusions effectively.
- **Apply mathematical concepts:** students will be able to apply mathematical concepts, conventions, and skills to identify patterns and describe phenomenon quantitatively.
- **Use standardised units:** students will be able to use standardised units effectively and perform appropriate calculations.
- **Respectful conversation:** the curriculum will create a space for students to engage in respectful conversation around challenging topics. This will enable them to develop their understanding of the complexity of decisions made within the field of science and how scientific advances have had an impact on the future of our planet.
- **Continuously evolving:** students will understand that scientific theories, laws, models and methods change over time to take into account new evidence.
- **Impact of science on us, our local and global communities:** students should be able to explain the contribution of science to our past and its role in our future. They should be able to use their knowledge of science to make well-informed decisions that impact themselves and their local and global community and be able to communicate and justify these to those around them.