Statement of intent: purpose of study

The Oasis 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. We have structured our curriculum around 15 'big questions' and aim for all students to leave Y11 able to meaningfully answer each using their knoweldge of our core concepts (often called 'big ideas'). We believe experiencing the phenomena studied is essential to making sense of these ideas and have set out the experiences we want students to have in each year of their journey.

Our students also develop a sense of what Science 'is' and how scientific knowledge has been developed through use of models, prediction, experimentation and the analysis of evidence. We aim for all our students to understand that scientific 'knowledge' is provisional and open to falsification in light of new evidence whilst appreciating scientific knowledge represents humanities best attempt to explain our material world. This will give our students the ability to act as global citizens able to grapple with the major issues of their generation and make good choices for themselves, their community and our planet.

Statement of intent: Our three C's

Character:
We develop students' character through warm teacher – student relationships and a balance of teacher exposition and dialogic discussion while we explore the human capacity to explain the material world. 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 societies capacity to overcome the ecological crisis they have inherited. We have a strong belief that science is for all and aim to develop the "scientific capital" for all students, regardless of background or starting point.

Competence:
We develop our students' competence through a curricula model that starts from students' existing knowledge of the world and gives them the experiences and explanations they need to develop a more scientific understanding. We have structured our curriculum so that students build up their sense of our core concepts gradually through being exposed to them in a range of context. This help students recognise the power of a small number of core concepts 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.

Community:
Our curriculum moves back and forwards between developing students' core knowledge of science and applying it to the major issues affecting the planet – climate change, biodiversity loss and the impact of pollution. 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.

Big Questions & core concepts

Our big questions have been developed from the ASE and Royal Societies curriculum project's which were first platformed publicly at the ASE conference in 2019 (Chemistry, Biology, Physics. We have also taken work from Jasper Green's "powerful ideas of science" and the 'BEST' project. All projects took as their starting point the work by Wynne Harlen's and others "the big ideas in science and how to teach them" and some of the thinking behind the "Beyond 2000" report into science education. We have sought to integrate our big questions and core concepts with the research based "BEST Evidence science teaching" progression mapping which is lead by the world leading University of York Science Education group. Our big questions are written so they make sense to students at all stages of their secondary science curriculum.

Biology	Chemistry (& Earth Science)	Physics
What are organisms made of? Core concept: Cellular basis of life **How do organisms grow and reproduce?** Core concept: Inheritance. *secondary concepts: growth and reproduction* **Why do organisms depend on each other and their environment?** Core concept: interdependence **Why are organisms so diverse?** Core concept: evolution **What keeps organisms healthy?** Core concept: health	**What are substances?** Core concept: substances **What gives substances their properties?** Core concept: bonding **What is chemical change?** Core concept: chemical change **How does chemistry affect our world?** Core concept: chemical earth **What is the Earth made of and how is it changing?** Core concept: dynamic earth	**What is matter?** Core concept: matter **Why do things move and change?** Core concepts: force and energy **How does information and energy spread?** Core concepts: waves (and energy) **What is electricity and magnetism?** Core concept: electromagnetism **Where are we in space?** Core concept: space

Substantive core concepts & End points: Biology

The national curriculum, and AQA exam specifications, for science set out a body of target knoweldge which is very broad. Our curriculum aims to help students scaffold this breadth of knoweldge by structuring KS4 content around a firm foundational understanding of how our core concepts provide meaningful answers to our big questions. Our KS3 (Y7-Y9) establishes a deep understanding of each question and our KS4 enriches these answers using the breadth and detail of the AQA exam specification. We aim for students to leave school having retained the ability to explain and expand the following answers to our questions long after their GCSE exams have been passed.

Big Question	Core concept(s)	End point
What are organisms made of?	Cellular basis of life	The cell is the basic unit of life from which organisms emerge. Organisms are adapted to survive in their environment. Multicellular organisms have different levels of organisation to maintain the conditions for life for all their cells.
How do organisms grow and reproduce?	Inheritance.	Organisms reproduce by passing their genetic information from one generation to the next. How an organism develops depends on its genome and its environment.
Why do organisms depend on each other and their environment?	Interdependence	Organisms compete with and depend on other organisms for the materials and energy that cycle through ecosystems. A change to one population, or environmental condition can have a huge impact on biodiversity.
Why are organisms so diverse?	Evolution	The diversity of organisms, living and extinct, is the result of evolution by natural selection.
What keeps organisms healthy?	Health	Health results from interactions between an organisms body, behaviour, its environment and other organisms.

Substantive core concepts & End points: Chemistry

The national curriculum, and AQA exam specifications, for science set out a body of target knoweldge which is very broad. Our curriculum aims to help students scaffold this breadth of knoweldge by structuring KS4 content around a firm foundational understanding of how our core concepts provide meaningful answers to our big questions. Our KS3 (Y7-Y9) establishes a deep understanding of each question and our KS4 enriches these answers using the breadth and detail of the AQA exam specification. We aim for students to leave school having retained the ability to explain and expand the following answers to our questions long after their GCSE exams have been passed.

Big Question	Core concept(s)	End point
What are substances?	Substances	Most materials are mixtures of substances. Materials made of single substances have distinct properties.
What gives substances their properties?	Bonding	All matter is made of atoms. The arrangement and bonding between atoms explains a substances properties. Bonding is the result of electrostatic attractions
What is chemical change?	Chemical change	In chemical reactions atoms are rearranged to form new substances. The new substances produced will have different properties from the substances they are formed from. Mass and energy are always conserved in chemical changes.
How does chemistry affect our world?	Chemical Earth	Substances can move within and between Earth's atmosphere, hydrosphere, geosphere and biosphere as part of large-scale Earth systems. Chemical substances produced by human activity are changing our planet.
What is the Earth made of and how is it changing?	Dynamic Earth	The structure of the earth is slowly changing. The Earth provides us with a rich source of resources

Substantive core concepts & End points: Physics

The national curriculum, and AQA exam specifications, for science set out a body of target knoweldge which is very broad. Our curriculum aims to help students scaffold this breadth of knoweldge by structuring KS4 content around a firm foundational understanding of how our core concepts provide meaningful answers to our big questions. Our KS3 (Y7-Y9) establishes a deep understanding of each question and our KS4 enriches these answers using the breadth and detail of the AQA exam specification. We aim for students to leave school having retained the ability to explain and expand the following answers to our questions long after their GCSE exams have been passed.

Big Question	Core concept(s)	End point
What is matter?	Matter	The world is made of matter and all matter is made of particles. The particle model can be used to explain how matter behaves. All matter is made of atoms which are made of smaller, sub atomic, particles.
Why do things move and change?	Force and energy	Changing the motion of an object requires a net force to be acting on it. Calculating the “energy” stored in a system allows us to make predictions about how much change is possible. This is because energy is always conserved but some energy is always dissipated into smaller and less useful stores.
How does information and energy spread?	Waves (and Energy)	Waves, including sound, water and electromagnetic waves transfer energy and information.
What is electricity and magnetism?	Electromagnetism	The movement of charge forms electric current and causes magnetic fields. We use electrical currents to power our society.
Where are we in space?	Space	The Earth is a tiny part of an unimaginably large 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 Core concepts & end points

Embedded in to our curriculum plans are explicit opportunities for students to develop their disciplinary knoweldge of science. We have sequenced how students develop their sense of how the three disciplines of science work around the following, discipline specific, concepts. These concepts and end points are based upon those suggested by the royal society of chemistry, royal society of biology and IOP's work on developing curriculum frameworks. We have also referenced relevant procedures and techniques in our sequencing as set out in the national curriculum and GCSE specifications.

How Physics works	
Concept	End point
Explanations *in Physics*	Aims for the most fundamental explainations that apply in widest range of situations
Falsification *in Physics*	Explainations include tests which support or disprove the idea.
Measurement *in Physics*	Explainations are based on observations and experimental measurements
Reasoning and argument *in Physics*	Arguments are developed from data, discussed and debated
Modelling *in Physics*	Many explainations use models to think with and use to make predictions
Mathematical formulation *in Physics*	Many models can be expressed as mathematical formulas

How Chemistry works	
Concept	End point
Models *in Chemistry*	Chemists use models of the sub microscopic domain of substances to explain the properties and behaviour of substances
Representations *in Chemistry*	Chemists use a range of unique symbols, formula, nomenclature, diagrams and equations
Classification, grouping & trends *in Chemistry*	Substances can be classified into groups. This enables chemists to identify patterns and trends.
Mathematics *in chemistry*	Data from chemical measurements can be used to identify trends.
Investigation *in Chemistry*	Provides evidence to test ideas. There are a range of qualitative and quantitative investigative techniques
Techniques *in Chemistry*	Chemistry requires skilled use of specialised equipment. This includes chemical measurement.

Disciplinary Core concepts & end points

How Biology works	
Concept	End point
Investigations *in Biology*	Biologists collect data in a variety of settings including field work. Variables in biology can be difficult to control.
Levels of study *in Biology*	Different biologists study life at different levels. From biological models to population of organisms
Ethics *in Biology*	Biologists have to carefully consider how specimens are sourced and treated during research
Analysis *in Biology*	Observations and data can be analysed and interpreted quantitatively and qualitatively
Continuous cycles *in Biology.*	A cycle of collecting and analysing data provides evidence that biologists use to develop and improve explanations, classification systems and models
Communication *in Biology*	Biologists communicate about their work with a range of audiences within and beyond the scientific community, to facilitate evidence-informed debate and decision-making.

'How science works'	
Concept	End point
Investigation	Many scientific investigations require careful consideration of what to control, change and measure. Where this is not possible other methods, like control groups can be used to increase validity
Reproducibility	Experimental findings must be repeatable by the team conducting them and reproducible by other teams.
Scientific community	New ideas are submitted for debate in scientific communities through publication in specialist journals with a process of peer review.
Analysis	There are conventions for presenting and interpreting scientific data including the use of tables and graphs.
Conclusions	Scientific conclusions are based on the strength of evidence provided. This includes the publishing and identification of anomalies and estimating uncertainty.