Subject overview: GCSE Physics

Subject Rationale (Intent)
Physics provides the foundation for all other sciences by asking the most fundamental of questions, such as those of energy and why processes happen or the questions of motion and the nature of atoms and the nucleus. The topic builds in application by looking at the rules of electricity and how we can harness the power of the atomic nucleus. The students who study the separate Sciences at GCSE have 3 teachers delivering the course, each with a specialism in a different Science discipline. The content delivered through the Separate Science course is aligned with the Combined Science course, but explores and develops certain topics and content in more depth. As there is a more significant amount of content to be delivered in the same amount of time allocated to the Separate Science course, the students are expected to complete a significant amount of flipped learning to allow for the completion of the course in the allocated time, and an additional 1 hour of learning is provided each week after School. Students will build on their strong base of understanding of the scientific process in year 7, 8 and 9 and will continue to build an understanding of the world around us. The teaching order has been arranged so students gain a broad experience throughout KS4. Explicit links between disciplines (biology, chemistry and physics) will be maintained. The students will revisit content that has been spiralled through the KS3 curriculum and will naturally spiral as the topics are taught through KS4. The teaching of subject topics will contain explicit links between the topics, allowing for students to make connections and deepen understanding. For example, many of the lessons start with recall of previous work through quick-fire questions or exam questions based on prior topics. This ensures that students are regularly revisiting prior learning and using that recall to build a foundation for the new learning occurring in each lesson. In KS4 students will use the literacy and numeracy skills that have been developed in KS3 to allow for an exam practice focus in KS4. High challenge is embedded within the Science curriculum throughout all key stages as teachers ‘teach to the top’, which comes through learning objectives and lesson-planning by staff. This then enables individual support to be identified and implemented on a case-by-case basis. Assessments are being developed to be skills-based, with the emphasis on higher order skills to ensure students are confident in applying knowledge and understanding to unfamiliar situations. The skills-based assessments will be set in the context of the topic studied and may involve maths and graph skills as well as extended writing on topics or lateral thinking to solve problems in new and unfamiliar contexts. Literacy and oracy is embedded throughout the curriculum with key words and concepts for each concept in lessons. Designated literacy activities are embedded into different lessons that will focus on the students ability to use the key words correctly and with confidence. These will also focus on students' ability to answer 3-6 mark exam questions. Collaboration in pairs and/or groups during practicals are an important part of Science at KS4. In each lesson there will be peer feedback, group discussions and/ or peer marking.

Feedback in Physics at Keystage 4	Literacy/ Oracy
Written comments in TA (Teacher Assessment Sheets) Teachers write short comments on teacher assessments - feeding forward to provide rapid progress - comments to highlight what was done well and one area for improvement. **Whole-class feedback** Once books/TA's/Assessments have been marked, teachers review common strengths and mistakes and discuss them with the class. Students then correct or improve their work based on the feedback. **Verbal feedback during lessons** Teachers circulate during practicals and independent work, giving immediate guidance and questioning students to improve understanding. Our department encourages students to act on this feedback straight away. **Assessment feedback sheets** After assessments, students receive information about topics they performed well in and areas needing further revision. We use a "traffic light" systems (red, amber, green) to indicate confidence or Mastery. **Dedicated Improvement and Reflection Time** Students are given lesson time to respond to feedback, correct misconceptions, answer follow-up questions, or improve previous work with a green pen. This helps ensure feedback leads to action rather than simply being read.	**Key words** are presented at the start of lessons and throughout. Context is given re. Polysemy - we have lots of vocabulary that crosses over and out of context can be confusing. Key words introduced at key times are useful to help remove misconceptions **Literacy mats** are being trialled in the department for students to lean on when developing their written responses - activities are being jointly planned to allow students to reference the literacy mats - supporting student responses by providing a scaffold **Bossy Verb** identification - When utilising exam questions, teachers aim student focus at command words (bossy verbs) - meanings are explained and students apply this in their responses i.e. describe vs explain **Reading aloud** (students and teachers) - students read aloud, BCAR students identified and targeted in lesson. Teachers model reading aloud to students **Key word glossaries** are provided to KS3 and KS4 students - most commonly shared via the google classroom

YEAR 10				
Term	**Topic sequence**	**Topic rationale Intent**	**Link to prior learning / skills development**	**Main method of assessment**
Term 1:1	4.2 Electricity	**4.2 Electricity** Students study current, voltage and resistance and apply V=IR. They interpret circuits, graphs and relationships between variables. The topic builds on KS3 physics and develops mathematical and practical skills. It explains how electricity is used safely and efficiently in everyday life and supports further study of physics and engineering.	**4.2 Electricity** Students build on their learning from Year 7 Current, Voltage and Resistance and Year 9 Electricity. They revisit the relationships between current, potential difference and resistance before applying these concepts to more complex circuits. Students develop mathematical skills through the use and rearrangement of equations, graph interpretation and data analysis. Practical investigations help students improve their ability to identify variables, collect accurate data and evaluate evidence. The topic also strengthens links between electricity and energy transfers studied previously in KS3. Electricity – Computer Science	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments, students receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills. **Year 10 assessment - week** - **Summative assessmen**t - Students complete an assessment during assessment week This not only assesses the skills and knowledge taught this year, but also other previously covered - but related - topics. This will help the students to formulate links.

Term 1:2	4.3 Particle model of matter	**4.3 Particle model of matter** Students use the particle model to explain states of matter, density and changes of state. It builds on KS3 physics and develops mathematical skills. The topic supports understanding of energy transfer and material behaviour in everyday life.	**4.3 Particle Model of Matter** Students build on their Year 7 learning about the Particle Model and Heating and Cooling. They revisit the arrangement and movement of particles in solids, liquids and gases before applying these ideas to explain changes of state, density and internal energy. Students develop mathematical skills through calculations involving density and graphical analysis of heating and cooling processes. Practical investigations strengthen observational and analytical skills, while the use of scientific models helps students explain everyday phenomena using evidence-based reasoning. Particle Model of Matter – Geography	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments, students receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills.
Term 2:1	4.3 Particle model of matter	**4.3 Particle model of matter** Students use the particle model to explain states of matter, density and changes of state. It builds on KS3 physics and develops mathematical skills. The topic supports understanding of energy transfer and material behaviour in everyday life.	**4.3 Particle Model of Matter** Students build on their Year 7 learning about the Particle Model and Heating and Cooling. They revisit the arrangement and movement of particles in solids, liquids and gases before applying these ideas to explain changes of state, density and internal energy. Students develop mathematical skills through calculations involving density and graphical analysis of heating and cooling processes. Practical investigations strengthen observational and analytical skills, while the use of scientific models helps students explain everyday phenomena using evidence-based reasoning. Particle Model of Matter – Geography	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments, students receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied

	4.4 Atomic structure	**4.4 Atomic Structure** Students learn about atomic structure, isotopes and radioactivity. It builds on KS3 chemistry. They develop understanding of nuclear processes and their uses. Mathematical skills include half-life calculations. The topic links to medicine and energy applications.	**4.4 Atomic Structure** Students build on their understanding of atoms from Year 7 and Year 9 studies of the Periodic Table and chemical reactions. They revisit atomic structure before exploring isotopes, radioactivity and nuclear radiation in greater depth. Students develop scientific literacy by evaluating the risks and benefits of radioactive materials in medicine, industry and energy production. Mathematical skills are strengthened through calculations involving half-life and decay. The topic also develops analytical skills through the interpretation of data and graphical information. Atomic Structure – History	literacy and numeracy skills. **Year 10 assessment - week - Summative assessment** - Students complete an assessment during assessment week This not only assesses the skills and knowledge taught this year, but also other previously covered - but related - topics. This will help the students to formulate links.
Term 2:2	4.4 Atomic structure 4.8 Space Physics	**4.4 Atomic Structure** Students learn about atomic structure, isotopes and radioactivity. It builds on KS3 chemistry. They develop understanding of nuclear processes and their uses. Mathematical skills include half-life calculations. The topic links to medicine and energy applications. **4.8 Space Physics** Questions about where we are, and where we	**4.4 Atomic Structure** Students build on their understanding of atoms from Year 7 and Year 9 studies of the Periodic Table and chemical reactions. They revisit atomic structure before exploring isotopes, radioactivity and nuclear radiation in greater depth. Students develop scientific literacy by evaluating the risks and benefits of radioactive materials in medicine, industry and energy production. Mathematical skills are strengthened through calculations involving half-life and decay. The topic also develops analytical skills through the interpretation of data and graphical information. Atomic Structure – History **4.8 Space Physics** Building on concepts taught in year 7 -	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments, students receive formative feedback and improvement prompts. Students will complete two ‘Teacher Assessed’ (TA’s) pieces of work which assess varied literacy and numeracy skills

		came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. 'Dark matter' - which bends light and holds galaxies together but does not emit electromagnetic radiation - is everywhere – what is it? And what is causing the universe to expand ever faster?	students will have identified objects within our solar system and the universe. Students will have studied the orbit of natural satellites such as the moon and have explored the idea of observing the universe in the Maggie Pocock unit studied in year 9. Students will look at how stars are born and why they die. Student will link to ideas covered in nuclear physics - fusion in stars and will use the theory of waves to help them with the concept of red shift	
Term 3:1	Exam focus	Time is given to help the students prepare for the upcoming end of year exams. Exam skills are embedded throughout the curriculum and this will provide an opportunity to develop these skills with an explicit focus on a certain skill within a topic. Science exam questions can typically contain both literacy and numeracy and students must lean on skills in all three disciplines (biology, chemistry and physics).	Students will be explicitly focusing on literacy and numeracy - in science. In literacy focussed lessons, students will look at things such as command words and how to use these to construct responses. Modelling and scaffolding will be used to help students form their written responses for long response questions. In numeracy focussed lessons students will practice such things as rearranging equations, substitutions, calculating the mean and calculating percentages. Within the umbrella of literacy and numeracy students will be focussing on practical skills and graph skills. In practical skills focussed lessons students will be identifying the rationale behind experimentation methods, identifying variables, uncertainties and errors. In graph skills lessons students will draw lines of best fit (straight and curved), identify relationships and analyse data they are presented.	**Summative assessment -** The students complete mock exams at the end of the year. These will be in the same format as the paper one Science exams.

Term 3:2	4.8 Space Physics	**4.8 Space Physics** Questions about where we are, and where we came from, have been asked for thousands of years. In the past century, astronomers and astrophysicists have made remarkable progress in understanding the scale and structure of the universe, its evolution and ours. New questions have emerged recently. ‘Dark matter’ - which bends light and holds galaxies together but does not emit electromagnetic radiation - is everywhere – what is it? And what is causing the universe to expand ever faster?	**4.8 Space Physics** Building on concepts taught in year 7 - students will have identified objects within our solar system and the universe. Students will have studied the orbit of natural satellites such as the moon and have explored the idea of observing the universe in the Maggie Pocock unit studied in year 9. Students will look at how stars are born and why they die. Student will link to ideas covered in nuclear physics - fusion in stars and will use the theory of waves to help them with the concept of red shift	
YEAR 10 EXAMS				

YEAR 11				
Term	**Topic sequence**	**Topic sequence rationale**	**Link to prior learning / skills development**	**Main method of assessment**
Term 1:1	4.5 Forces	**4.5 Forces** Students study motion, forces and acceleration. They build on KS3 physics and apply mathematical equations and graphs. The topic explains real-world motion and supports engineering applications.	**4.5 Forces** Students build on Year 8 Contact Forces, Year 9 Forces and earlier studies of speed and gravity. They revisit balanced and unbalanced forces before developing a more detailed understanding of motion, acceleration, momentum and pressure. Mathematical skills are a key focus, with students applying equations, interpreting graphs and analysing relationships between variables. Practical investigations strengthen experimental skills and encourage students to evaluate evidence. This topic supports further understanding of engineering, transport and many real-world applications of physics. Forces – Physical Education	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills.
Term 1:2	4.5 Forces	**4.5 Forces** Students study motion, forces and acceleration. They build on KS3 physics and apply mathematical equations and graphs. The topic explains real-world motion and supports engineering applications.	**4.5 Forces** Students build on Year 8 Contact Forces, Year 9 Forces and earlier studies of speed and gravity. They revisit balanced and unbalanced forces before developing a more detailed understanding of motion, acceleration, momentum and pressure. Mathematical skills are a key focus, with students applying equations, interpreting graphs and analysing relationships between variables. Practical investigations strengthen experimental skills and encourage students to evaluate evidence. This topic supports further understanding of	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments receive formative feedback and improvement prompts. Students will complete two

	4.6 Waves	**4.6 Waves** Students study wave properties including frequency and wavelength. They build on KS3 physics and explore applications in communication and medicine. The topic develops mathematical and graphical skills.	engineering, transport and many real-world applications of physics. Forces – Physical Education **4.6 Waves** Students build on Year 7 Sound and Light and Year 8 Wave Effects and Wave Properties. They revisit key concepts such as frequency, wavelength and energy transfer before studying wave behaviour in greater detail. Students strengthen mathematical skills through calculations involving wave speed and the interpretation of graphical data. Practical investigations help develop experimental and analytical skills, while scientific literacy is enhanced through exploration of modern technologies that rely on wave behaviour, including communication systems and medical imaging. Waves – Music	'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills.
Term 2:1	4.6 Waves	**4.6 Waves** Students study wave properties including frequency and wavelength. They build on KS3 physics and explore applications in communication and medicine. The topic develops mathematical and graphical skills.	**4.6 Waves** Students build on Year 7 Sound and Light and Year 8 Wave Effects and Wave Properties. They revisit key concepts such as frequency, wavelength and energy transfer before studying wave behaviour in greater detail. Students strengthen mathematical skills through calculations involving wave speed and the interpretation of graphical data. Practical investigations help develop experimental and analytical skills, while scientific literacy is enhanced through exploration of modern technologies that rely on wave behaviour, including communication systems and medical imaging. Waves – Music	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills. **JANUARY MOCK EXAMS**

Term 2:2	4.7 Magnetism and electromagnetism	**4.7 Magnetism and electromagnetism** Students study magnetic fields, motors and generators. It builds on KS3 physics and electricity. The topic develops understanding of technology and engineering applications.	**6.7 Magnetism and Electromagnetism** Students build on Year 8 Magnetism and Electromagnetism and Year 9 Electricity. They revisit magnetic fields, magnetic materials and electromagnets before exploring motors, generators and transformers. Students develop mathematical skills through the application of equations and analysis of relationships between variables. Practical investigations strengthen experimental techniques and problem-solving skills. This topic demonstrates how scientific understanding underpins modern technologies and provides opportunities for students to apply knowledge from multiple areas of physics studied throughout KS4. Magnetism and Electromagnetism – Design Technology	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments receive formative feedback and improvement prompts. Students will complete two 'Teacher Assessed' (TA's) pieces of work which assess varied literacy and numeracy skills.
Term 3:1	4.7 Magnetism and electromagnetism	**4.7 Magnetism and electromagnetism** Students study magnetic fields, motors and generators. It builds on KS3 physics and electricity. The topic develops understanding of technology and engineering applications.	**6.7 Magnetism and Electromagnetism** Students build on Year 8 Magnetism and Electromagnetism and Year 9 Electricity. They revisit magnetic fields, magnetic materials and electromagnets before exploring motors, generators and transformers. Students develop mathematical skills through the application of equations and analysis of relationships between variables. Practical investigations strengthen experimental techniques and problem-solving skills. This topic demonstrates how scientific understanding underpins modern technologies and provides opportunities for students to apply knowledge from multiple areas of physics studied throughout KS4. Magnetism and Electromagnetism – Design Technology	**Formative assessment emphasis** - This happens throughout the scheme of learning. This will range from small stake testing and self and peer assessments in lessons, and identified exam questions/teacher assessments receive formative feedback and improvement prompts. **GCSE exams**

		Time is given to help the students prepare for the upcoming end of year exams. Exam skills are embedded throughout the curriculum and this will provide an opportunity to develop these skills with an explicit focus on a certain skill within a topic. Science exam questions can typically contain both literacy and numeracy and students must lean on skills in all three disciplines (biology, chemistry and physics).		
Term 3:2	**GCSE Exams**			**GCSE Exams**
Public Exams				