Curriculum Overview

PHYSICS

At James Calvert Spence College, we provide a broad and balanced, ambitious curriculum for all pupils. Our physics curriculum builds upon the knowledge and skills pupils have developed in first school through a well-planned and sequenced curriculum. Our curriculum plans follow the National Curriculum as well as drawing upon best practice within the field of physics. We draw on evidence-based research to ensure our curriculum is high quality and meets the needs of our pupils. We provide regular opportunities to revisit learning, so it becomes embedded in our pupils' long-term memory. Disciplinary knowledge such as scientific skills, data analysis and practical opportunities, are embedded within the topics covered.The overview of our plan is below:

Important note: Due to some teaching groups being shared between two or three science teachers, the order in which topics are taught may vary slightly between classes. Rest assured, all students will receive full coverage of the curriculum within the academic year.

Assessment: Assessments are provided in line with the school's assessment schedule and written feedback is calendared for pupils. We also provide live feedback as described below.						
Year	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
7*	**<u>Scientific skills</u>** Pupils will be given the opportunity to develop their scientific skills at the start of year 7. They will be introduced to laboratory safety including risks and hazards and will gain experience in using appropriate apparatus, set up and use a Bunsen burner. Pupils will deepen their knowledge of asking scientific questions, identifying and choosing appropriate variables, and plan their own investigations. **<u>Forces</u>** In this topic, students explore the concept of forces and how they affect the motion of objects.		**<u>Light and Sound</u>** In this topic, students investigate the properties and behaviour of light and sound waves. They learn how light travels in straight lines and how it can be reflected, refracted, and absorbed by different materials. The topic covers the structure of the eye and how we see, as well as the basics of colour and shadows. Students also explore sound waves, including how they are produced, how they travel through different media, and how the ear detects sound. Practical activities develop skills in observing wave behaviours, measuring speed and frequency, and interpreting data. This topic introduces key concepts of wave physics, helping students		**<u>Space</u>** In this topic, students explore the universe beyond Earth, focusing on the solar system, stars, and galaxies. They learn about the structure and motion of the solar system, including the planets, moons, and other celestial bodies. The topic covers the Earth's rotation and revolution, explaining day and night, seasons, and eclipses. Students also investigate the life cycle of stars and the vast scale of the universe. Through models, research, and observations, students develop an understanding of gravity's role in space and how scientific knowledge about space has developed over time. This topic fosters curiosity about astronomy and the nature	

	They learn to identify different types of forces, such as gravity, friction, and air resistance, and understand how forces can be represented with arrows showing magnitude and direction. Students investigate balanced and unbalanced forces and their effects on stationary and moving objects. The topic introduces basic concepts of speed, velocity, and acceleration, and covers practical applications such as levers, pulleys, and gears to understand mechanical advantage. Through hands-on experiments, students develop skills in measuring forces, recording data, and drawing conclusions, laying the foundation for further study in mechanics and energy. **Maths in Science** The *Maths in Science* strand develops students' confidence in applying mathematical skills to scientific contexts. Students learn to manipulate data, interpret graphs, calculate rates and ratios, and use units and significant figures accurately, using the appropriate skills required for their year. These skills support practical work, strengthen scientific reasoning, and prepare students for the quantitative demands of the Science curriculum.	understand everyday phenomena related to light and sound. **Maths in Science** The *Maths in Science* strand develops students' confidence in applying mathematical skills to scientific contexts. Students learn to manipulate data, interpret graphs, calculate rates and ratios, and use units and significant figures accurately, using the appropriate skills required for their year. These skills support practical work, strengthen scientific reasoning, and prepare students for the quantitative demands of the Science curriculum.	of our place in the cosmos.
8*	**Maths in Science** The *Maths in Science* strand develops students' confidence in applying mathematical skills to scientific contexts. Students learn to manipulate data, interpret graphs, calculate rates and ratios, and use units and significant figures accurately, using the appropriate skills required for their year. These skills support practical work, strengthen scientific reasoning, and prepare students for the quantitative demands of the Science curriculum. **Energy** In this topic, students investigate different forms	**Maths in Science** The *Maths in Science* strand develops students' confidence in applying mathematical skills to scientific contexts. Students learn to manipulate data, interpret graphs, calculate rates and ratios, and use units and significant figures accurately, using the appropriate skills required for their year. These skills support practical work, strengthen scientific reasoning, and prepare students for the quantitative demands of the Science curriculum. **Electricity** In this topic, students explore the principles of	**Motion and Moments** In this topic, students explore the principles of motion and rotational forces (moments). They learn how to describe motion using speed, velocity, and acceleration, and interpret distance-time and velocity-time graphs. The topic also introduces forces that cause rotation, focusing on moments — the turning effect of a force — and how to calculate them using the formula moment = force × distance from pivot. Students investigate factors that affect moments, such as levers and balances, and apply these concepts to everyday machines and structures. Practical activities develop skills in measuring

	of energy and how energy is transferred, stored, and conserved. They learn about kinetic, potential, thermal, chemical, electrical, and nuclear energy, and explore energy changes in everyday systems. The topic covers the principle of conservation of energy and introduces energy efficiency and renewable versus non-renewable energy sources. Students develop practical skills by conducting experiments to measure energy transfer, calculate efficiency, and understand power. Through analysis and problem-solving, students deepen their understanding of how energy drives physical processes and the importance of sustainable energy use in society.	electricity and how electric circuits work. They learn about current, voltage, resistance, and how these variables relate through Ohm's Law. Students build and analyse series and parallel circuits, using circuit diagrams and symbols to represent components. The topic covers the function of components such as resistors, bulbs, switches, and batteries. Students also investigate the safety aspects of electricity and the role of electricity in everyday life and technology. Through practical investigations, students develop skills in circuit construction, measurement of electrical quantities, and problem-solving, building a solid foundation for further study in physics and engineering.	motion, analysing forces, and problem-solving, enhancing understanding of how forces influence both linear and rotational movement.
9	**<u>Particle Model of Matter</u>** In this topic, students deepen their understanding of the particle model to explain the properties and behaviour of solids, liquids, and gases. They study particle arrangement, motion, and energy in different states of matter, and explore processes such as melting, boiling, condensation, and sublimation. The topic covers the concepts of pressure in gases, diffusion, and the effects of temperature and volume changes on particle movement. Students use the particle model to explain changes of state and to interpret real-world phenomena. Practical activities enhance skills in observation, measurement, and data analysis, reinforcing the link between microscopic particle behaviour and macroscopic properties.	**<u>Hot and Cold Physics</u>** In this topic, students explore the concepts of heat, temperature, and thermal energy transfer. They learn the difference between heat and temperature and investigate how heat moves through conduction, convection, and radiation. The topic covers thermal expansion, insulation, and the effects of heating and cooling on different materials. Students examine temperature scales and measure temperature changes in practical investigations. Through experiments and real-life examples, students develop an understanding of how thermal energy affects matter and how energy transfer is relevant to everyday life and engineering. **<u>Maths in Science</u>** The *Maths in Science* strand develops students' confidence in applying mathematical skills to scientific contexts. Students learn to manipulate data, interpret graphs, calculate rates and ratios, and use units and significant figures accurately, using the appropriate skills required for their year. These skills support practical work, strengthen scientific reasoning, and prepare	**<u>Forces</u>** In this topic, students build on prior knowledge to explore forces in greater depth. They study different types of forces, including gravitational, frictional, air resistance, and tension forces, and how these affect motion. The topic covers Newton's laws of motion, force diagrams, and the concepts of resultant force and equilibrium. Students learn to calculate force, mass, and acceleration using mathematical equations and explore factors affecting motion such as friction and terminal velocity. Practical investigations develop skills in measuring forces, analyzing motion, and applying scientific reasoning to real-world scenarios. **<u>Electricity</u>** In this topic, students extend their understanding of electric circuits by exploring current, voltage, and resistance in more detail. They learn how to construct and analyze series and parallel circuits, and investigate how components like resistors, bulbs, and motors affect the circuit. The topic covers Ohm's Law, electrical power, and energy transfer in circuits. Students also study the practical applications of electricity,

		students for the quantitative demands of the GCSE course.	including safety considerations and the impact of electricity use on society and the environment. Through hands-on experiments, students develop skills in circuit building, data collection, and quantitative analysis.
10	**Combined Science** **Energy** Building on their learning in key stage 3, pupils will be learning about energy stores and changes in a system, specific heat capacity, gravitational potential, kinetic energy, elastic energy. They will look at the conservation and dissipation of energy as well as the use of energy resources**.**	**Combined Science** **Particle model of matter** Building on their learning in key stage 3 pupils they will be learning about changes of state and the particle model. Pupils will learn about internal energy and energy transfer, particle model and gas pressure. **Electricity** Building on their learning in key stage 3, pupils will be learning about electric circuits, current, potential difference, resistance.	**Combined Science** **Electricity (continued)** Pupils will continue to build on their understanding of electricity by looking at the domestic uses of electricity, electrical safety, energy transfers and the national grid. **Atomic structure** Atoms and nuclear radiation, hazards and uses of radioactive emissions and background radiation.
10	**Separate science** **Energy** Building on their learning in key stage 3, pupils will be learning about energy stores and changes in a system, specific heat capacity, gravitational potential, kinetic energy, elastic energy. They will look at the conservation and dissipation of energy as well as the use of energy resources**.** **Electricity** Pupils continue to learn about the domestic uses of electricity and safety, energy transfers and the national grid	**Separate science** **Electricity (continued)** Building on their learning in key stage 3, pupils will be learning about static electricity**,** electric circuits, current, potential difference, resistance. **Particle model of matter** Building on their learning in key stage 3 pupils will be learning about changes of state and the particle model, internal energy and energy transfer. Pupils then focus on the particle model of gases, and the factors affecting gas pressure	**Separate science** **Atomic structure** Atoms and nuclear radiation, hazards and uses of radioactive emissions and background radiation; nuclear fission and fusion.. **Waves** Building on year 7 and 8 knowledge, pupils will begin the waves topics focusing on electromagnetic waves and the behaviour of waves in air, fluids and solids.

11	**Combined Science** **Forces** During term 1 pupils will understand the difference between scalar and vector quantities. They will describe motion along a straight-line using graphs to analyse the data using mathematical skills. They will begin to explore Newton's laws of motion and use them to explain the motion of the planets and all the objects in the universe. They will look at motion of objects and how their stopping distances are affected by external factors.	**Combined Science** **Waves** Building on year 7 & 8 knowledge, pupils will begin the waves topics focusing on electromagnetic waves and the behaviour of waves in air, fluids and solids.	**Combined Science** **Magnetism and electromagnetism** Pupils will recall magnetism and poles of magnets and magnetic fields from key stage 3 and progress how to plot magnetic fields and how they change around a magnet. Pupils will also look at electromagnetism and making an electromagnet. **Preparation for external examinations**
11	**Separate science** **Magnetism and electromagnetism** Pupils will expand upon the knowledge of magnets and electromagnets they acquired in key stage 3. They will learn about permanent and induced magnetism, magnetic forces and fields, electromagnetism, the motor effect and the generator effect as well as studying transformers. **Forces** Continuing on from key stage 3, pupils will study forces and their interactions, moments, work done and energy transfer. They will consider the motion of objects and Newton's Laws of motion. Pupils will then further enhance their understanding of forces and acceleration, momentum, and pressure.	**Separate science** **Waves** Building on year 7 and 8 knowledge, pupils will begin the waves topics focusing on electromagnetic waves and the behaviour of waves in air, fluids and solids. They will then focus on the behaviour of light including reflection, refraction, colours and the applications of lenses.	**Separate science** **Space** Pupils will also have the opportunity to link ideas from year 10 on nuclear fission to describe the lifecycle of a star and how elements are formed from hydrogen in them. They will apply ideas from their forces topic to describe and explain what keeps planets and satellites moving in their orbits. Pupils will use their knowledge of the electromagnetic spectrum to describe redshift and explain the evidence behind the universe expanding. They will also acquire knowledge about the beginning and the future of the universe. **Preparation for external examinations**

Examples of on-going assessment and feedback in lessons
● Verbal feedback by the teacher to the whole class which pupils act on in the lesson; this is often evidenced using green pen. ● Pupils self-assess or peer-assess work with a clear framework guiding them through this.

- Teachers circulate to give ’LIVE’ and immediate feedback as pupils are working independently.
- Pupils may complete mini quizzes or retrieval activities that revisit prior learning and receive verbal feedback.
- Use of tailored questioning by the teacher.