

Science Curriculum Intent

The intent of the Science Department at Richmond Park Academy is to prepare students to deeply explore, critically question, and intellectually engage with the scientific world they experience. Richmond Park Academy scientists build long term retention of knowledge by making links between the powerful ideas of the three science disciplines. Our aim is to provide opportunities to develop the scientific skills of observing, hypothesising, problem-solving, and analysing so students can better independently investigate and understand the community and world in which they live.

Curriculum Overview

Year 7		
Year 7 - The Building Blocks of Science - This year is all about setting the stage for each students' science journey at RPA. Therefore, we start with a science skills course to ensure all students have the basic skills they need to operate safely in the lab. During this course students engage in a scientific inquiry project to learn about the scientific method first hand. During the latter part of the autumn term, we focus on the building blocks of science: cells, atoms, energy, and forces. In spring we build on these foundations, understanding how to identify different chemicals and understanding how cells work together to build complex body systems like digestion and reproduction. In Summer, we explore the physical world of forces and finish the year with learning about additional body systems - the respiratory and muscular-skeletal.		
Autumn	Spring	Summer
<p>Science Skills - What is the scientific method? How do scientists work together to build our understanding of the world around us? Why is the scientific method important?</p> <p>Biology - Cells - What are all living things made of? How can we ethically study living things?</p> <p>Chemistry - The Particle Model - What are the building blocks for all substances on earth? How has our understanding of atoms changed throughout history? Why is understanding atoms important?</p>	<p>Physics - Energy - What are the fundamental laws of energy? How is energy stored and transferred? How does the human body get energy from food? Where does the power in my house come from?</p> <p>Biology - Digestion - How does my body use the food that I eat? How does disease like obesity affect the NHS?</p> <p>Biology - Reproduction in Animals, Reproduction in Plants - How do plants and animals reproduce to make more plants and animals? Why should bees be protected?</p>	<p>Physics - Forces - How do all atoms interact? How can I control variables in an investigation into the best type of surface for a running track?</p> <p>Biology - Respiratory Muscular and Skeletal Systems - What is the difference between breathing and respiration? How does changing a specific variable affect the breathing rate of a year 7 student? How do muscles work together to cause movement? Why do we need a skeleton?</p>



Chemistry - Elements, Compounds, Mixtures - How do different elements interact with each other? What are the different types of chemical reactions? How does acid rain affect the environment? What is the cost/benefit analysis of using crude oil?	Chemistry - Acids and Alkali - What is pH? What are acids and alkalis? What are examples of these chemicals that we come into contact with in everyday life? What is a neutralisation reaction?	
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Year 8		
<p>Year 8 - Interactions Between Building Blocks - This year, students will spend the first part of the Autumn term building their understanding of atoms by exploring what happens when atoms interact during chemical reactions. Next, students will explore two major chemical reactions that take place in nature: photosynthesis and respiration. This takes into consideration the interaction between living organisms in the ecosystem. During the spring term, students explore the interaction of particles in waves, forces in motion, the Earth and its resources and energy in electrical circuits. In summer students will start by applying their understanding of electricity to the interaction of magnetic fields and electromagnets. Lastly, they will explore two units of biology: interdependence and evolution. Students finish the year with a unit on Space and Gravity, to understand interactions on a planetary scale.</p>		
Autumn	Spring	Summer
<p>Chemistry - Chemical Reaction - what happens during a chemical reaction? How do we know that a chemical reaction has taken place? How do chemical reactions such as incomplete combustion affect our environment?</p> <p>Biology - Respiration - what is respiration and where does it take place? What are the effects of exercise on respiration? Should athletes be allowed to take drugs that allow them to carry more oxygen (EPO)?</p> <p>Biology - Photosynthesis - How are leaves adapted to carry out photosynthesis? How can we speed up the rate of photosynthesis? Why is photosynthesis important for the atmosphere?</p>	<p>Physics - Waves - what are the properties of waves? How do we know that light travels faster than sound? How do animals use echolocation? How do glasses help correct problems with the eye?</p> <p>Physics - Motion - How do we calculate the speed of an object using a distance/time graph? What is the purpose of the control group in an investigation? How do average speed cameras work?</p> <p>Chemistry - The Earth and its Resources - How do we know that the Earth's atmosphere has changed over time? What is the greenhouse effect and what are its impacts? Why is it difficult to tackle global issues such as global warming? What really happens to the plastic you throw away?</p> <p>Physics - Electrical Energy - Why can we bend water with a glass rod? How does current compare in series and parallel circuits? Which</p>	<p>Physics - Magnets and Electromagnets - How do magnets relate to the planet earth? How can electromagnets be useful?</p> <p>Biology - Interdependence - What are biotic and abiotic factors? What is microcosm and how do we create one? How do changes in population impact food chains and food webs? How is energy lost between organisms in a food chain? What are the effects of bioaccumulation?</p> <p>Biology - Evolution - How are characteristics inherited? How do we extract DNA from strawberries? How do mutations impact evolution? Why do humans carry out selective breeding? What is the importance of biodiversity to the global ecosystem? What are the ethics of wildlife management and conservation?</p> <p>Physics - Gravity and Space - Where is our place in the universe? What causes the seasons? How can we justify exploring space when there are</p>

	type of circuit would be best for a house? What happens when a circuit is incomplete?	other things to spend money on here on earth? Will we ever live on Mars?
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Year 9		
<p>Year 9 - Foundations - In year 9, students begin the year solidifying the foundations of each strand of science: Biology, Chemistry, and Physics. In Autumn 2, they begin the introductory unit of chemistry called Atomic Structure and the Periodic Table followed by a biology unit on cells and cell division. In the spring term students will continue cell biology with transport in cells, where they explore and investigate how substances are transported across the cell membrane. Next, students build their knowledge on infection and response where students will understand and develop an appreciation of how our immune system works to defend us against infectious diseases. Students finish the summer term with a physics unit introducing the core concepts around energy and energy resources. In the summer term, students will study the particle model of matter to predict the behaviour of solids, liquids and gases which helps to explain a wide range of observations such as why it is difficult to make a good cup of tea high up a mountain. In addition, they will complete a chemistry unit on bonding, which explains the structure and properties of different compounds. The final unit studied in year 9 is energy changes. In this unit they will explore the transfer of energy that often takes place when chemical reactions occur. As part of this unit students will use their understanding of energy transfers to explain how things such as cold packs work.</p>		
Autumn	Spring	Summer
<p>Basics of Biology - An overview of the major themes in biology: Cells, Organ Systems, DNA, Evolution by Natural Selection, and Biodiversity.</p> <p>Cornerstones of Chemistry - An overview of the major themes in chemistry: Atoms, Bonding, Chemical Changes, Chemistry of the Atmosphere, and the Earth's Resources.</p> <p>Principles of Physics - An overview of the major themes in physics - States of Matter, Energy, Forces, Motion, Waves, Electricity</p> <p>Chemistry - Atomic structure and the Periodic table - What are atoms? How are elements organised in the periodic table? Why do ions form? How do we separate mixtures of atoms? How is the position of an element in the periodic</p>	<p>Biology - Transport in cells - How do cells transport substances across its membrane? What is a passive process? How does a change in concentrations of salt or sugar solutions impact the mass of plant tissue? What are the differences between osmosis, diffusion and active transport?</p> <p>Biology - Infection and Response - Are all microorganisms harmful? How does our body defend us against invisible enemies? How do vaccines prevent illnesses? Why can it take up to 10 years to develop a new drug?</p> <p>Physics - Energy - How is energy stored and transferred? How is power related to energy and time? How is energy conserved and dissipated?</p>	<p>Physics - Particle Model of Matter - How do we determine the densities of regular and irregular solid objects and liquids? How is the motion of the molecules in a gas related to both its temperature and its pressure?</p> <p>Chemistry - Chemical Bonding - what are ions and how are they formed? What are ionic compounds and how do we represent their structures? What are covalent structures and how do simple and giant covalent structures compare with one another? What are the limitations of using various models to represent molecules or giant structures? Why can some structures conduct electricity while others do not? Why don't we make jewellery from pure metals such as gold?</p>



<p>table related to the arrangement of electrons? Why do group 1 elements get an increasing reaction down the group?</p> <p>Biology - Cells and Cell Division - How are prokaryotic and eukaryotic similar and different? How do we calculate the size of an image produced by a microscope? What are the limitations of light and electron microscopes? Why are the different steps in a cell cycle integral to the formation of a new cell? How might the use of stem cells raise ethical concerns?</p>	<p>What is efficiency, and how efficient are the appliances we use in everyday live? Where does power come from? Which energy sources are renewable and non-renewable?</p>	<p>Chemistry - Energy Changes - How do we distinguish between exothermic and endothermic reactions? What is activation energy? How do we calculate the energy transferred in chemical reactions using bond energies?</p>
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