Curriculum Vision

Faculty S	Science	Subject	Biology, Chemistry & Physics
-----------	---------	---------	------------------------------

Our Vision

Faculty Vision						
We aim to provide a high-quality science curriculum which is ambitious for all students.						
We want them to develop a sense of excitement and curiosity about natural phenomena.						
We want to foster their ability to think critically and creatively so that they can analyse the world they live in.						
 Students will do this by Acquiring a sound base of knowledge of facts and understanding of scientific principles. Developing an understanding of the evidence for the science. Developing scientific method - carrying out practical work to investigate ideas, gathering evidence for evaluation and analysis to support scientific ideas and draw reasoned conclusions. Using scientific and mathematical models to develop understanding. 						

Curriculum Intent

Rationale for Science Curriculum Intent

Our aim is to develop a love of science, to develop future scientists and teach them about the vast application and wonders of science in their everyday lives. Therefore, the science curriculum has been designed around 3 key principles:

- 1. Develop understanding of science by teaching substantive concepts within the big ideas in appropriately sequenced, component steps.
- 2. Emphasis on diagnostic questioning to reveal preconceptions and common misunderstandings.
- 3. Development of scientific skills through scientific enquiry, integrated into each unit enabling students to make predictions and observations and then explain and analyse their findings so that they can form conclusions.

The substantive and disciplinary knowledge and key vocabulary has been carefully sequenced to ensure that new content builds upon prior learning, enabling students to develop understanding and skills which are essential at GCSE and beyond. This is based on the research carried out by Best Evidence Science Teaching.

We use lesson preparation to ensure that the lessons meet the needs of all pupils. Staff spend time using planned resources to prepare for their lessons. This involves identifying the key knowledge and skills that the students need to be able to know, show and remember by the end of the lesson. There is a focus on prior learning and key vocabulary. An exemplar answer is produced. This is then used in lessons to intentional monitor the learning and adapt teaching appropriately.

Teaching involves clear teacher explanations and worked examples that make knowledge explicit to pupils. This might include analogies and models that help pupils to make the links between concrete and abstract concepts. There is a strong emphasis on reading, writing, and talking in science lessons enabling students to focus on key subject vocabulary and recap and orally rehearse and structure their thoughts using scientific language.

Reflecting the The Arthur Terry Learning Partnership Curriculum Aims

The ATLP curriculum aims to provide children with a broad and academic programme that closely follows the National Curriculum.

Our provision is a coherent and carefully sequenced (knowledge engaged) curriculum based on the principles of cognitive science. There is a focus on the development of literacy and the application of acquired knowledge to ensure children access the curriculum at a depth to ensure a deep and enduring understanding in discrete subject areas.

The content and experiences within our curriculum are designed to accumulate and address the gaps in cultural capital of all our students in particularly the disadvantaged. Our extra-curricular offer supports our provision, with a focus within each subject thus helping to form stronger schemata for long term retention.

Reflecting the Purpose and Aims of Science from the NC Programme of Study

A high-quality science education provides the foundation for understanding the world through the specific disciplines of biology, chemistry, and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes, and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about national phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- Are equipped with the scientific knowledge required to understand the uses and implications for science, today and for the future.

Aspect of intent	Why is this important?	What will it look like in lessons?
Develop and apply scientific knowledge	Scientific literacy is needed to understand our society and world and allow us to make informed	Subject specific content is delivered by experts.
	decisions about health, environment, and the wider world.	A knowledge rich curriculum that is split into key components of learning within the individual disciplines.
		Concepts are built from concrete, easier concepts to more abstract and challenging concepts. This is based on evidence from BEST.
		Taking account of the common misunderstandings and misconceptions.
Foster curiosity and critical thinking	By asking questions we develop deeper understanding and knowledge as well as stimulating the thinking in others.	Questioning that allows thinking time about key concepts and how they might apply in alternative scenarios.
	The ability to ask questions about the	Opportunities to engage in practical investigations based on previously taught
	information in front of us allows us to make better informed decisions	substantive knowledge.
	that affect our lives.	

		Discussions in class with many participants actively listening and contributing. Evaluation tasks that stimulate higher level thinking skills.
Scientific method	Practical experiments help pupils to understand both substantive and disciplinary knowledge.	The purpose of the scientific approach will be signposted.
		There is a scatfolded approach to aspects of the scientific method building towards the
	Developing knowledge of scientific approaches by testing methods,	full process in Post 16.
	formulating and testing a hypothesis and collecting and analysing data, before drawing conclusions will enable students to make evidence-	Skills taught, reinforced, and revisited throughout the 5-year curriculum in different units of work.
	based decision later in life.	

Overview of the curriculum content:

The content is viewed as a coherent 5-year spiral curriculum, with opportunities for spaced retrieval, covering the National curriculum at KS3 and 4 and the GCSE specification for AQA combined and separate sciences. Adaptive teaching is used to ensure that the teaching meets the needs of all our pupils. It builds on from and incorporates the planning completed by the ATLP Science group, in terms of resources and sequencing in Years 7 and 8, but is then adapted as we move through into Year 9 to provide additional pace and challenge for our students.

Recovery Curriculum adaptations

We have identified the content in biology, chemistry and physics that is most important for enabling pupils to build up their knowledge of key scientific concepts. We also identified the most important procedures and concepts underpinning the scientific method that may not be as secure following remote teaching. We are incorporating opportunities to retrieve knowledge and address gaps that appear, as well as increasing the scaffolding and support for scientific skills, including graphs, tables and the scientific method.

Our curriculum is mapped progressively in terms of substantive and disciplinary knowledge including mathematics. For each scientific discipline there are five big ideas containing component concepts that build into composite knowledge.

In Biology the big ideas are:- The Cellular Basis for life / Heredity and Life Cycles / Organisms and their Environment / Variation Adaptation and Evolution /									
	VEAR 7 VEAR 8 VEAR 9 VEAR 10 VEAR 11								
The collular basis of	Autumn	Autumn	Autump	Autump 1	• Inhoritanco				
life	<u>Autumn</u> Colls & Organisation	<u>Autumn</u> Riconorgatics							
me	Cells & Organisation	Bioenergetics	Cells Animal plant and to now	Cells Fyshanging	 DNA The structure of DNA 				
	Cells as the fundamental	Reactants and products of	- Animal, plant and to now	= Exchanging	 The structure of DNA and Dratain synthesis 				
	Unit of living organisms	photosynthesis with a	(prokonyotos (oukonyotos)	substances/exchange					
	= Functions of the cell	Bhotosynthesis uses	(prokaryotes/eukaryotes)	Surfaces:	Initiations				
	Observing interpreting	Photosynthesis uses	- Microscopy and	• Lungs – respiratory					
	- Observing, interpreting		progressing to calculating	System (year 8)					
	and recording cell	molecules		• VIII – Digestive system	• X & Y chromosomes				
	structures using a light	 Adaptations of leaves for 	conversion of units	(year 9)	 Genetic diagrams Juda suite di dia andore 				
	microscope	photosynthesis – lear	 Cell differentiation and 	 Leaves – plant Leaves – plant 	 Innerited disorders Variation 				
	 Similarities and 	tissues	specialisation	organisation (year 8)	Variation				
	differences between	Aerobic respiration with a	Diffusion retrieval	• Specialised cells retrieval					
	plant and animal cells	word summary	• Osmosis	Stem Cells	Antibiotics and Antibiotics and				
	The role of diffusion in	Anaerobic respiration in	Active Transport	Chromosomes and cell	antibiotic resistance				
	the movement of	humans with a word		division – mitosis	Speciation				
	substances in and out of	summary	Autumn 2	Binary Fission (separates)	Fossils				
	cells	Anaerobic respiration in	 Organisation 	• Cancer	Selective breeding				
	Adaptations of unicellular	microorganisms including	 Hierarchical organisation 	Monoclonal antibodies –	Genetic engineering				
	organisms from cells to	fermentation	of multicellular	linked to cancer	Cloning				
	organ systems	Differences between	organisms	treatment	Classification				
	The structure and	aerobic and anaerobic	Supplying cells – the						
	function of the human	respiration	circulatory system	<u>Autumn 2</u>					
	skeleton	Structure and functions of	The heart	 Organisation 					
	Interaction between	the gas exchange system in	Blood vessels	More on enzymes and					
	skeleton and muscles	humans, including	The blood	digestion					
	Antagonistic muscles	adaptations to function		Investigating enzymatic					
		The mechanism of		reactions					
		breathing to move air in		The circulatory system –					
		and out of the lungs, using		the heart					
		a pressure model		The circulatory system –					
				blood vessels					

		 The impact of exercise, 	The circulatory system	
		asthma and smoking on	blood	
		the human gas exchange	Cardiovascular system	
		system	CV disease and	
		The role of leaf stomata in	treatments	
		gas exchange in plants	More on plant cell	
			organisation	
			Transpiration and	
			translocation	
			Transpiration and the	
			rate of transpiration	
			Spring 1	
			Bioenergetics	
			Photosynthesis retrieval	
			Word and symbol	
			equations for	
			photosynthesis	
			The rate of	
			photosynthesis - limiting	
			factors	
			Measuring the rate of	
			photosynthesis	
			 Ideal conditions for 	
			photosynthesis -	
			greenhouse (separates)	
			 Plant diseases 	
			(separates)	
			 Respiration 	
			 Metabolism 	
			 Aerobic and anaerobic 	
			respiration	
			 Exercise 	
Heredity and life	Spring		Summer	
	Reproduction		Homeostasis	
Cycles	<u>Reproduction</u>		 Homeostasis 	
			The nervous system	
			- The hervous system	

	 Structure and function of the male and female reproductive system Menstrual cycle without details of hormones Gametes Fertilisation Gestation and birth Maternal lifestyle on the foetus through the placenta Contraception Reproduction in flowering plants Flower structure 			 Reflexes Investigating reaction time The brain (separates) The eye (separates) Controlling body temperature (separates) The endocrine system Controlling blood glucose Diabetes The kidneys (separates) Puberty and the menstrual cycle Controlling fertility Adrenaline and Thyroxine
Organisms and their environment	 Reproduction in flowering plants Flower structure Wind & insect pollination Fertilisation Seed and fruit formation and dispersal Summer Interdependence Food chains and food webs Interdependence within ecosystems Biodiversity 		Summer Ecology Competition Abiotic & biotic factors Adaptations interdependence, food chains, predator prey Quadrats and transects Deforestation, lane use, waste management	 nucleity and the menstrual cycle Controlling fertility Adrenaline and Thyroxine Plant hormones (separates) Investigating plant growth (separates Spring 2 Ecology Carbon and water cycle Decay and investigating decay Global warming Biogas Trophic levels Pyramids of biomass / transfer
			waste management	 Food security and farming Biotechnology
Variation, adaptation and evolution		Summer Genetics Genetic information -DNA, genes and chromosomes		

	 Differences between species Variation between individuals within a species being continuous or discontinuous Natural selection & evolution Adaptation and extinction 		
Health and disease	 <u>Spring</u> <u>Nutrition & Health</u> Content of a healthy balanced diet Plants making carbohydrates in their leaves by photosynthesis Energy requirements Malnutrition Organs of the digestive system Functions of the organs of the digestive system Medicinal vs Recreational drugs Alcohol Smoking 	 <u>Spring</u> <u>Infection & Health</u> What is health - physical/mental Communicable diseases – pathogens and how they spread Communicable diseases – symptoms, signs, transmission, treatment Culturing bacteria First line of defence Second line of defence – WBC Vaccinations Non communicable diseases CHD Non communicable diseases cancer Genetic diseases 	

In Chemistry the big ideas are:- Substances and properties / Particles and structure / Chemical reactions / Earth chemistry / Dynamic Earth							
YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11			
Autumn 1 • HSW practical on dissolving • Spring • Separation techniques • Pure and impure substances • Solubility • Solubility Practical • Rock Salt • Separating Mixtures • Chromatography • Distillation	Autumn Periodic table Atoms Elements Electron configuration Development of the periodic table Physical and chemical properties Metals and non-metals Group 1 Group 7 Group 0	 <u>Autumn 1</u> Atoms, elements, compounds and mixtures Chemical Formula and conservation of mass Atomic structure The development of the model of the atom Electronic Configuration and the periodic table Isotopes Group 1 including chemical equations and reasons for trend in reactivity Group 7 including chemical equations and reasons for trend in reactivity Displacement reactions and ionic equations Transition metals (chemistry only) <u>Autumn 2</u> Organic chemistry Crude oil and alkanes Fractional Distillation Cracking Uses of hydrocarbons Reactions of alkenes 	 <u>Autumn</u> Quantitative Conservation of mass Balancing equations Relative formula mass Calculating Moles Amount of substance in an equation Using moles to balance equations Concentration of solution Percentage Yield (Chemistry Only) Atom economy (Chemistry Only) Using concentration of solutions in Mol/dm3 (Chemistry Only) Use of the amount of substance in relation to volumes of gases (Chemistry Only) 	 Organic chemistry Alcohols (chemistry only) Properties and combustion of alcohols (chemistry only) Carboxylic acids (chemistry only) Carboxylic acids (chemistry only) Natural and addition polymers Condensation polymers (chemistry only) Pure and Impure substances Chromatography Interpreting Chromatograms Testing gases Tests for Positive Ions Tests for negative ions Instrumental methods Flame emission spectroscopy Reversible reactions and dynamic equilibrium Energy changes and roursible reactions 			
<u>Spring</u> ■ Solids, liquids and gases ■ Changes of state	<u>Spring</u> ■ Acids and alkalis ■ pH scale	Spring Chemical bonds Ionic bonding	Spring The rate and extent of chemical change				

 Evaporation and condensation Diffusion Brownian motion Gas pressure 	 Neutralisation Metals and acids Metals and water Oxidation Displacement Metal Ores 	 Ionic compounds Covalent bonding Properties of simple covalent molecules Giant covalent structures Metallic bonding Properties of metals and alloys Rusting and corrosion Polymers Properties of Polymers Glass and ceramics Nanoparticles 	 Collision theory Factors that affect the rate of chemical reactions The effect of changing Surface area on rate of reaction Catalysts 	 The effect of changing conditions on equilibrium (HT only) The effect of changing concentration (HT only) The effect of temperature and pressure changes on equilibrium (HT only) Haber Process Economics of the Haber process Making fertilizer in the lab v in industry
Summer • Chemical reactions • Indicators of chemical reactions • Elements • Compounds • Atoms and the periodic table • Making compounds • Balancing equations • Conservation of mass • Exothermic and endothermic reactions	Summer • Chemistry in the atmosphere • Combustion • Carbon cycle • Greenhouse effect • Earth structure • Igneous rock • Sedimentary rock • Metamorphic rock • Rock cycle • Ceramics	 Summer Exothermic and endothermic reactions Energy transferred during endothermic and exothermic reactions Reaction Profiles Bond energies Cells and Batteries (chemistry only) Fuel cells (chemistry only) 	 Summer Redox reactions Reactivity of metals The reactivity series Extraction of metals by reduction Phyto mining and bioleaching Neutralisation of acids and salt production Soluble salts Titrations (Chem) Strong and weak acids (chem) Electrolysis Electrolysis of molten ionic compounds Using electrolysis to extract metals Electrolysis of aqueous materials Half equations 	 Redox reactions Reactivity of metals The reactivity series Extraction of metals by reduction Phyto mining and bioleaching Neutralisation of acids and salt production Soluble salts Titrations (Chem) Strong and weak acids (chem) Electrolysis Electrolysis of molten ionic compounds Using electrolysis to extract metals Electrolysis of aqueous materials Half equations

In Physics the big	ideas are:- Matter / Force and M	lotion / Sound Light and Waves	/ Electricity and Magnetism /	Space	
	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11
Matter	<u>Spring</u>	<u>Autumn</u>	Summer:	Autumn	<u>Electricity</u>
	<u>P2: Energy I</u>	<u>P4: Energy II</u>	Particles	<u>Energy</u>	Review of current,
	Using physical processes	Simple machines give	All substances are made	Energy stores and	potential difference
	and mechanisms, rather	bigger force but at the	of particles.	systems (Links to year 8)	and resistance.
	than energy, to explain	expense of smaller	The kinetic energy of a	Explore Conduction,	Resistance in a wire
	the intermediate steps	movement (and vice	particle is linked to its	Convection to explain	Resistors
	that bring about such	versa): product of force	temperature.	energy transfer.	Filament bulbs
	changes	and displacement	The energy of particles	(Progression year 8)	Diodes, LDRs,
	Comparing the starting	unchanged	causes a change in the	Conservation of energy	Thermistors
	with the final conditions	Heating and thermal	bond energy and	Energy changes in	Domestic electricity
	of a system and	equilibrium: temperature	therefore the state.	systems	Power and energy
	describing increases and	difference between two	Solids, liquids and gases	Efficiency	transfer in everyday
	decreases in the amount	objects leading to energy	have different	Reducing unwanted	appliances (Review
	of energy associated with	transfer from the hotter to	properties.	energy	from energy year 10)
	movements,	the colder one, through	Different substances	Insulating materials	National grid (Review)
	temperatures, changes in	contact (conduction) or	require different	Kinetic energy	from energy year 10)
	positions in a field, in	radiation; such transfers	amounts of energy to	Gravitational energy	
	elastic distortions and in	tending to reduce the	heat them or to change	Changes in energy	<u>Separates</u>
	in chemical	temperature difference:	their states.	(Progression year 7)	Static electricity
	compositions.	use of insulators	The above can be	Elastic potential energy	(Progression year 8)
	Other processes that	Differences in resistance	investigated and a	(Calculations from forces	Electrical; fields
	involve energy transfer:	between conducting and	heating/ cooling curve	Year 9)	IV characteristics
	change motion, dropping	insulating components	applied.	Specific heat Capacity	
	an object, completing an	(quantitative)	Pressure is linked to	(Heating and cooling	<u>Magnets</u>
	electrical circuit,	Comparing energy values	volume and	curves)(Taken from the	 Magnetism
	stretching a spring,	of different foods (from	temperature.	particles topic)	(Progression year 8)
	metabolism of food,	labels) (kJ)	 Different substances 	Power	 Magnetic fields
	burning fuels.	 Comparing power ratings 	have different densities	Renewable resources	(Progression Year 8)
		of appliances in watts (W,	based on their mass and	(Link Year 8)	Electromagnets
		kW).	their volume.	Non-Renewable	(Progression year 8)
				resources (link year 8)	Motors

		 Comparing amounts of energy transferred (J, kJ, kW hour) Domestic fuels bills, fuel use and costs Fuels and energy resources. 	 Atmospheric pressure, decreases with increase of height as weight of air above decreases with height. 	 National grid (Year 8) National grid and energy resources (Year 8) <u>Summer</u> <u>Atomic Structure:</u> Atoms and their structures (Progression from year 9 chemistry) Isotopes (Progression year 10 chemistry) Development of the atomic model (Review chemistry Year 10) Radioactive decay Half life Types of radiation Radioactive contamination Uses of radiation Separates Background radiation Nuclear fission and Fusion (Progression Year 8 energy). 	 F = B x I x i Separates Motor effect, left hand rule Electrical motors Induced potential (Link year 11 electricity. Transformers (Link year 11 electricity) Spring Separates Only Space and the universe Space and beyond (progression year 7) Life cycle of a star Stars and elements Doppler effect How the universe began Evidence for the big bang (CMB) Orbital motion.
Force and Motion	 Autumn Forces and their effects Forces as pushes and pulls, arising from the interaction between two objects Using force arrows in diagrams, adding forces in one dimension, 		Autumn Forces Forces and their effects: Forces are a push or a pull that acts on an object due to the interactions with another object: Al forces that act on objects are either Contact Forces	 Forces - Application Describe interactions between pairs of objects that produce a force on each other. Terminal Velocity (link balanced forces) Acceleration (Progression year 9) 	

balanced and unbalanced	where objects are	Uniform acceleration
forces	touching (Progression	(Progression Year 9)
Non-contact forces:	year 7)	Stopping distances
gravity forces acting at a	non-contact forces,	Momentum
distance on Earth and in	where the forces act at a	Car safety
space, forces between	distance. (Progression	Change in momentum
magnets and forces due	year 7)	Newtons third Law of
to static electricity	Vectors and Scalars and	motion
Speed and the	examples of each.	
quantitative relationship	Balanced and	Separates:
between average speed,	unbalanced forces:	Vector diagrams
distance and time	Relating to sinking and	Atmospheric pressure
The representation of a	floating, motion of	(Progression Year 9)
journey on a distance-	objects. (Progression	Pressure in liquids
time graph	year 7)	(Progression Year 9)
Relative motion: trains	Links to calculating	Moments and gears
and cars passing one	resultant forces.	(Progression Year 9)
another	(Progression year 7)	Centre of mass
Forces being needed to	Forces: associated with	
cause objects to stop or	deforming objects;	
start moving, or to	stretching and squashing	
change their speed or	 – springs; (Progression 	
direction of motion	year 7)	
(qualitative only)	Forces measured in	
Change depending on	newtons, measurements	
direction of force and its	of stretch or	
size	compression as force is	
	changed (Progression	
	year 7)	
	Force-extension linear	
	relation; Hooke's Law as	
	a special case, energy	
	changes on deformation	
	(Progression year 7)	
	Work done If work is	
	done, a force has been	

	 applied to move an object Moment as the turning effect of a force Simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement upchanged 	
	 Pressure Atmospheric pressure, decreases with increase of height as weight of air above decreases with height Pressure in liquids, increasing with depth; up thrust effects, floating and sinking Pressure measured by ratio of force over area – acting normal to any surface. 	
	 Forces and motion forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only) (Progression year 7) Change of speed depends on direction of force and its size 	

Sound Light and Spring Waves Waves Sound Light and Spring Waves Waves Ripple tank (Links to wave structure and calculating waves speed). Waves The similarities and differences between light waves and the waves in matter - Use of ray model to explain mission of light of light - EMS - EMS Uight waves travelling through a vacuum; speed of light - The transmission of light of light - The transmission of light through materials: - The transmission of light through materials: - The transmission of light through materials: - EMS uses and dangers absorption, diffuse - Stattering and specular - EMS uses and dangers - Use of ray model to explain misgin mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the hight and prisms action of convex lens in focusing (qualitative); the human eye - Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and electrical effects; photoses ensitive material in the refraction of light and electrical effects; photoses ensitive material of colours and the different focusing (qualitative); the human eye - Use of ray model to effects in absorption and effects in absorption and effects; photoses ensitive material or human eye; - Use of ray model to effects in absorption and effects in absorption and effects in absorption and in cameras transferring energy; use of oteletion and effect in a do in cameras transferring energy; use of otelection and effect in and in cameras tra			(Distance time graphs, Velocity time graphs)	
Sound Light andSpringWavesWAVES: ApplicationWavesP5: Light• Use of ray model to• Ripple tank (Links toWaves• The similarities andexplain reflection andwave structure anddifferences between lightrefraction of light andcalculating wave speed).waves and the waves inmatter• EMSmatter• Light waves travellingthe human eye.• EMS• Light waves travellingthrough materials:absorption, diffuse• Leslie cans (RP)• The transmission of lightthrough materials:absorption, diffuse• Leslie cans (RP)• Use of ray model to• Use of ray model to• Sound waves• Use of ray model to• Usight ransferring energy• Sound waves• Use of ray model to• Use of ray model to• Leslie cans (RP)• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Sound waves• Use of ray model to• Light transferring energy• Seismic waves• Colours in of light and• Colours and the different• Seismic waves• Colours in of light and• Colours and the different• Colours and the differenti• Use of ray wodel t			(Progression year 7)	
WavesP5: Light- Use of ray model to explain reflection and ifferences between light waves and the waves in 	Sound Light and	<u>Spring</u>	<u>Waves</u>	WAVES: Application
 The similarities and differences between light waves and the waves in matter explain reflection and differences between light waves and the waves in matter explain reflection and action of convex lens in focusing (qualitative); explain reflection at a surface explain reflection of light and actor of convex lens in focusing and specular reflection of a surface explain imaging in mirrors, the print and in cameras explain reflection of light, white light and action of convex lens in focusing (qualitative); explain reflection at a surface explain reflection at action of light and action of convex lens in focusing (qualitative); explain reflection at asurface explain reflection at action of convex lens in focusing (qualitative); explain reflection at asurface explain reflection at action of convex lens in focusing (qualitative); explain reflection at asurface explain imaging in mirrors, the refraction of light and action of convex lens in focusing (qualitative); explain transferring energy focusing (qualitative); explain transferring energy focusing (qualitative); explain transferring energy for source to absorber light ransferring energy; for cleaning and in cameras explain reflection and refraction and electrical effects; photosensitive material in the refraction of light, white light and prisms explain reflection and refraction and electrical effects; photosensitive material in the refrainal colour explain transferring energy; for cleaning and in cameras explain reflection and refraction and exploration. explain transferring energy; for cleaning and in cameras colour wavelength (Lin	Waves	<u>P5: Light</u>	Use of ray model to	Ripple tank (Links to
differences between light waves and the waves in matterrefraction of light and action of convex lens in focusing (qualitative); the human eye.calculating waves speed).Light waves travelling through a vacuum; speed of lightfiber through avacuum; speed of lightThe transmission of light through materials: absorption, diffuseFMS uses and dangers • KMS uses and dangers • Visible spectrumThe transmission of light through materials: absorption, diffuse scattering and specular reflection at a surfaceThe transferring energy from source to absorber eledifical effects; photo- sensitive material in the refraction of light, thransferring energy from source to absorber leading to chemical and electricial effects; photo- sensitive material in the refrection and electricial effects; photo- sensitive material in the refrection and electricial effects; photo- sensitive material in the refrection and in cameras for cleaning and previse for cleaning and previse for cleaning and previse for cleaning and previse for cleaning and in cameras electricial effects; photo- sensitive material in the refrection and electricion for cleaning and previsoure to absorberSeismic waves elemented light, white electricial effects; photo- sensitive material in the refrection and effects in physiotherapy by ultra- group and fiftesSeismic waves and exploration.Colours and the different frequencies of light, white light and prisms (qualitative only);Colour effects for cleaning and physiotherapy by ultra- sound; wavesWaves for detection and exploration.Colour send the different frequencies of light, white light and prisms (qualitative only);Foresu		The similaritie	explain reflection and	wave structure and
waves and the waves in matteraction of convex lens in focusing (qualitative); the human eye.EMS is MS uses and dangersI light through a vacuum; speed of lightThe transmission of light through materials: absorption, diffuseThe transmission of light through materials: absorption, diffuseInfrared radiationI through materials: absorption, diffuseThe transmission of light through materials: scattering and specular reflection at a surfaceInfrared radiationI Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light ad action of convex lens in focusing (qualitative); the human eyeUltrasound (Progression year 9)I Utrasound (Progression year 9)Seismic wavesI Ught transferring energy from source to absorberUltrasound (Progression year 9)I light transferring energy from source to absorberInage and ray diagrams concave lenses and magnification (Link to reflection af a surfaceI Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeInage and ray diagrams concave lenses and magnification (Link to reflection and electrical effects; photo- sensitive material in the reflection and in camerasImage and ray diagrams concave lenses and magnification.I Use to absorber for source to absorberdiffuse reflection of reflection and electrical effects; photo- sensitive material in the retina and in camerasVaves for detection and magnification.I Use to the camera in the reflection and in cameras ensitive		differences be	etween light refraction of light and	calculating wave speed).
matterfocusing (qualitative); the human eye.EMS uses and dangersLight waves travelling through a vacuum; speed of lightThe transmission of light through materials: absorption, diffuse scattering and specularThe transmission of light through materials: absorption, diffuse scattering and specularInfrared radiationLight values of a ymodel to explain imaging in mirrors, the pinhole camera, the refraction of convex lens in focusing (qualitative); the human eyeSound wavesLight transferring energy refrection at a surfaceSound wavesLight transferring energy reflection at a surfaceSound wavesUse of ray model to refraction of light and action of convex lens in focusing (qualitative); the human eyeLight transferring energy form source to absorberLight transferring energy refraction of light and ecluin at a surfaceOlours and the different frequencies of light, white light and prisms (qualitative); the human eyeSeismic wavesLight transferring energy form source to absorber leading to chemical and electrical effects in absorption and electrical effects in absorption and electrical effects in absorption and electrical effects in absorption and electrical effects; photo- sensitive material in the reflaction and refraction transferring energy, use for cleaning and physiotherapy by ultra- for cleaning and exploration.Waves for detection and exploration.Colour, wavelength (Links to year 9)Colour, wavelength (Links to year 9)Colour/ wavelength (Links to year 9)Colour sand the different frequencies of light, white light and prisms (qualitative o		waves and the	e waves in action of convex lens in	■ EMS
Light waves travelling through a vacuum; speed of lightthe human eye.• Radio sound waves• Nadio sound waves• The transmission of light through materials: absorption, diffuse reflection at a surface scattering and specular reflection at a surface explain imaging in mirrors, the pinhole camera, the sensitive material in the refraction of light and focusing (qualitative); the human eye.• Radio sound waves • Visible spectrum • Italia in • Leslie cans (RP)• Use of ray model to explain imaging in mirrors, the pinhole camera, the scattering energy the pinhole camera, the sensitive material in the refraction of light and focusing (qualitative); the human eye.• Sound waves • Sound waves • Ollar and in cameras • Ultrasound (Progression year 9)• Light transferring energy (qualitative); the human eye• Colours and the different (qualitative only); • Concave lenses and effects in absorption and electrical effects; photo- sensitive material in the • Pressure waves• Radio sound waves • Visible spectrum • Sound waves • Ultrasound (Progression vear 9)• Light transferring energy from source to absorber electrical effects; photo- sensitive material in the reflection and in cameras electrical effects; photo- sensitive material in the reflection and effects for cleaning and electrical effects; photo- sensitive material in the reflection and effects for cleaning and reflection and effects in absorption.• Colour/ wavelenth exploration.• Colours and the different frequencies of light, white light and prisms (qualitative only);• Colour/ wavelenth exploration.• Colour sand the different fight and pris		matter	focusing (qualitative);	EMS uses and dangers
 through a vacuum; speed of light The transmission of light of light The transmission of light through materials: absorption, diffuse scattering and specular light transferring and specular light transferring and specular light transferring energy the pinhole camera, the prefraction of light and action of convex lens in focusing (qualitative); the human eye light transferring energy from source to absorber leading to chemical and electrical effects; photo- sensitive material in the retina and in cameras Colours and the diffuse ensitive material in the retina and in cameras Colours and the diffuse ensitive material in the retina and in cameras Colours and the diffuse ensitive material in the retina and in cameras Colours and the diffuse ensitive material in the retina and in cameras Colours and the different frequencies of light, white reflection and exploration. Colour/ wavelength (links to year 9 colour) (links to year 9 colour) (links to year 9 colour) and fifterential colour effects ghysiotherapy by ultra- soundy waves and fifters and prims (qualitative only); differential colour effects babortin and diffuse electrical effects photo- sensitive material colour effects babortin and diffuse electrical effects photo- sensitive material colour effects babortin and diffuse electrical effects photo- sensitive material colour		Light waves tr	avelling the human eye.	Radio sound waves
of lightthrough materials: absorption, diffuseInfrared radiation• The transmission of light through materials:absorption, diffuse scattering and specular reflection at a surfaceSeparates; Sound waves• Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the physion transferring energy the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the phuse reflection at and in cameras the pinhole camera, the refraction of light and action of convex lens in action of convex lens in sensitive material in the human eyeSeismic waves (Utrasound (Progression year 9)• Light transferring energy from source to absorberUltrasound (Progression year 9)Seismic waves• Light transferring energy from source to absorberUltrasound (Progression year 9)Seismic waves• Light transferring energy from source to absorber(qualitative), the ifrequencies of light, white light and prismsImage and ray diagrams• Light transferring energy from source to absorber(differential colour effects in absorption and reflection and refraction effects; photo- sensitive material in the retina and in camerasPressure wavesWaves for detection and exploration.• Colours and the different frequencies of light, white light and prisms (qualitative only);Pressure wavesSeisoricion.• Colours and the different frequencies of light, white light and prisms (qualitative only);Pressure wavesSeiond exploration.• Colours and the different <td></td> <td>through a vac</td> <td>uum; speed • The transmission of light</td> <td>Visible spectrum</td>		through a vac	uum; speed • The transmission of light	Visible spectrum
 The transmission of light through materials: absorption, diffuse Leslie cans (RP) Leslie cans (RP) Searates: Sound waves reflection at a surface Sound waves Progression Year Use of ray model to leading to chemical and PHearing (Link to the explain imaging in mirrors, the pinhole camera, the refraction of light and refraction of convex lens in focusing (qualitative); the human eye Light transferring energy Sessitive material in the refraction of light, white electrical effects; photo- sensitive material in the refraction of convex lens in focusing (qualitative); the human eye Light transferring energy Sesnitive material in the refina and in cameras Colours and the different exploration. Colours and the different reflection and refraction Year 9) Waves for detection and exploration. Coloury waves for detection and exploration. Coloury waves for detection and exploration. Coloury waves or detection and exploration. Coloury waves or dolour and filters) Hask to year 9 colour and filters) Black body radiation 		of light	through materials:	Infrared radiation
through materials: absorption, diffusescattering and specular reflection at a surfaceSeparates: Sound wavescattering and specularLight transferring energy reflection at a surfaceSound waves· Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeItelating to chemical and retina and in cameras ifferential colour9)Hearing (Link to the ear Year 9)· Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and retina and in convex lens in focusing (qualitative); the human eyeSound waves (Progression Year 9)Hearing (Link to the ear Year 9)· Light transferring energy from source to absorber(Qualitative only); (Qualitative only); concave lenses and differential colour diffuse reflection sensitive material in the refraction and refraction Year 9)· Lenses Convex/concave magnification (Link to reflection and refraction Year 9)· Light transferring energy from source to absorber(diffuse reflection offiction clour diffuse reflection reflection and refraction Year 9)· Waves for detection and exploration. Year 9)· Colours and the different frequencies of light, white light and prisms (Qualitative only); (Links to year 9 colour and filters)· Waves for detection and exploration. · Colour/ wavelength (Links to year 9 colour and filters)· Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects for conversion to and filters)· Black body radiation·		The transmiss	ion of light absorption, diffuse	Leslie cans (RP)
absorption, diffuse scattering and specularreflection at a surface Light transferring energy From source to absorberSeparates: Sound wavesUse of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeleading to chemical and explane intervers sensitive material in the refraction of light and retina and in camerasSeismic wavesUse of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyecolours and the different tequencies of light, white light and prismsUltrasound (Progression year 9)Use of transferring energy from source to absorbercolours and the different transferring energylight end prismsLight transferring energy from source to absorberdifferential colour magnification (Link to reflection and refraction year 9)leading to chemical and effects in absorption and effects in absorption and exploration.Colours and the different retina and in camerascolours and the different for cleaning and for cleaning and exploration.Colours exploration.Colours and the different frequencies of light, white light and prismscolour for cleaning and gound wavesColour exploration.Colours and the different frequencies of light, white light and prismsphysiotherapy by ultra- sound; wavescolour exploration.Colours and the different frequencies of light, white light and prismsfor cleaning and sound; wavescolour exploration<		through mate	rials: scattering and specular	
scattering and specular reflection at a surfaceLight transferring energy from source to absorberSound wavesUse of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeleading to chemical and electrical effects; photo- sensitive material in the refraction of light and retina and in camerasUltrasound (Progression year 9)Light transferring energy ear Year 9)Ollours and the different frequencies of light, magnification (Link to magnification (Link to reflection and refraction electrical effects; photo- sensitive material in the electrical effects; photo- sensitive material in the refraction and in camerasUltrasound (Progression year 9)Light transferring energy from source to absorber eleading to chemical and electrical effects; photo- sensitive material in the retina and in camerasConcave lenses and magnification (Link to reflection and refraction Year 9)Colours and the different frequencies of light, white light and prismsPressure wavesWaves for detection and exploration.Colours and the different frequencies of light, white light and prismsColours and the different or cleaning and physiotherapy by ultra- sound; wavesColour/ wavelength (Links to year 9 colour and filters)Light transferring energy in absorption and electrical effects in differential colourexploration.Colour/ wavelength (Links to year 9 colour and filters)Light and prisms (qualitative only);transferring information for conversion to and filters)Black body radiationLigh		absorption, di	iffuse reflection at a surface	Separates:
reflection at a surfacefrom source to absorber(Progression Year• Use of ray model toleading to chemical and9)Hearing (Link to the• explain imaging in mirrors,electrical effects; photo-ear Year 9)the pinhole camera, thesensitive material in the• Seismic wavesrefraction of light andretina and in cameras• Ultrasound (Progressionaction of convex lens in• Colours and the different• Lenses Convex/concavehuman eyewhite light and prisms• Lenses Convex/concave• Light transferring energy(qualitative only);Concave lenses andfrom source to absorberdifferential colourmagnification (Link toleading to chemical andeffects; photo-reflection and refractionelectrical effects; photo-sensitive material in the• Vear 9)sensitive material in the• Pressure waves• Waves for detection andelectrical effects; photo-diffuse reflection• Vear 9)sensitive material in the• Pressure waves• Waves for detection andretina and in camerastransferring energy; use• Colour/ wavelengthfrequencies of light, whitephysiotherapy by ultra-• Colour/ wavelengthlight and prismssound; waves• Black body radiationifferential colour effectsin absorption and• Black body radiation		scattering and	J specular • Light transferring energy	Sound waves
• Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeleading to chemical and electrical effects; photo- sensitive material in the retina and in cameras • Ultrasound (Progression year 9)• Colours and the different focusing (qualitative); the human eye• Colours and the different frequencies of light, white light and prisms• Lenses Convex/concave magnification (Link to magnification (Link to reflection and reflects in absorption and electrical effects; photo- sensitive material in the electrical effects; photo- sensitive material in the retina and in cameras• Ultrasound (Progression year 9)• Light transferring energy from source to absorber leading to chemical and electrical effects; photo- sensitive material in the retina and in cameras• Concave lenses and magnification (Link to reflection and reflectsion addiffuse reflection vear 9)• Colours and the different frequencies of light, white light and prisms• Pressure waves for cleaning and physiotherapy by ultra- sound; waves• Colour/ wavelength (Links to year 9 colour and filters)• Colours and the different light and prismsphysiotherapy by ultra- sound; waves• Black body radiation• Colour and diffuse ifferential colour effectsfor conversion to and filters)• Black body radiation		reflection at a	surface from source to absorber	(Progression Year
explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyeelectrical effects; photo- sensitive material in the retina and in camerasear Year 9)Light transferring energy from source to absorber leading to chemical and electrical effects; photo- sensitive material in the refication (Link to reflectionConcave lenses and magnification (Link to reflection Year 9)Lenses Convex/concaveVerify (qualitative); the human eyewhite light and prisms (qualitative only); Concave lenses and magnification (Link to reflection vear 9)Image and ray diagrams Concave lenses and magnification (Link to reflection and refraction vear 9)Verify (Light ransferring energy; from source to absorber leading to chemical and electrical effects; photo- sensitive material in the retina and in camerasPressure waves transferring energy; use for cleaning and physiotherapy by ultra- sound; wavesWaves for detection and exploration.Colour/ wavelength (Links to year 9 colour and filters)(Links to year 9 colour and filters)Black body radiationIght and prisms (qualitative only);conversion to for cleaning and physiotherapy by ultra- sound; wavesBlack body radiation		Use of ray mo	del to leading to chemical and	9)Hearing (Link to the
the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eyesensitive material in the retina and in cameras• Seismic waves• Ultrasound (Progression action of convex lens in focusing (qualitative); the human eye• Colours and the different frequencies of light, white light and prisms• Lenses Convex/concave• Light transferring energy from source to absorber(qualitative only); differential colour• Image and ray diagrams Concave lenses and magnification (Link to reflection and refraction leading to chemical and electrical effects; photo- sensitive material in the retina and in cameras• Waves for detection and exploration.• Colours and the different frequencies of light, white light and prisms• Colours and the different offerential colour• Waves for detection and exploration.• Colours and the different ifrequencies of light, white light and prisms• Colours and the different for cleaning and sound; waves• Colour/ wavelength (Links to year 9 colour and filters)• Colours and the different ight and prismsfor conversion to and filters)• Black body radiation• Differential colour effects in absorption and diffice differential colour effects• Black body radiation		explain imagir	ng in mirrors, electrical effects; photo-	ear Year 9)
refraction of light and action of convex lens in focusing (qualitative); the human eyeretina and in cameras Colours and the different frequencies of light, white light and prisms• Ultrasound (Progression year 9)• Light transferring energy from source to absorber(qualitative only); differential colour• Lenses Convex/concave• Light transferring energy from source to absorber(qualitative only); differential colour• Image and ray diagrams Concave lenses and magnification (Link to reflection and refraction Year 9)• Light transferring energy from source to absorberdiffuse reflection diffuse reflectionYear 9)• Waves for detection and retina and in cameras• Pressure waves transferring energy; use exploration.• Waves for detection and exploration.• Colours and the different frequencies of light, white light and prisms• Colour, wavelength (Links to year 9 colour and filters)• Golour waves (qualitative only); transferring information differential colour effects in absorption and diffuse• Black body radiation		the pinhole ca	amera, the sensitive material in the	Seismic waves
action of convex lens in focusing (qualitative); the human eye• Colours and the different frequencies of light, white light and prisms• Lenses Convex/concave• Light transferring energy from source to absorber(qualitative only); differential colour• Concave lenses and magnification (Link to reflection and refraction electrical effects; photo- sensitive material in the retina and in cameras• Pressure waves transferring energy; use • Colours and the different diffuse reflection• Waves for detection and exploration.• Colours and the different frequencies of light, white light and prisms• Oclour/ wavelength (Links to year 9 colour and filters)• Colour/ wavelength (Links to year 9 colour and filters)• Colours and the different light and prisms• Conversion to ential colour effects• Black body radiation• Galitative only); sensitive material colour effects in absorption and diffuse• Prevision to ential colour effects• Black body radiation		refraction of li	ight and retina and in cameras	Ultrasound (Progression
focusing (qualitative); the human eyefrequencies of light, white light and prisms• Lenses Convex/concave• Light transferring energy from source to absorber(qualitative only); differential colour• Image and ray diagrams Concave lenses and magnification (Link to reflection and refraction electrical effects; photo- sensitive material in the retina and in cameras• Enses Convex/concave• Colours and the different frequencies of light, white glight and prisms• Deressure waves transferring energy; use transferring and (Links to year 9 colour and filters)• Colour/ wavelength (Links to year 9 colour and filters)• Colours and the different frequencies of light, white light and prismsfor conversion to sound; waves• Black body radiation• Black body radiation• electrical signals by• electrical signals by• Black body radiation		action of conv	vex lens in Colours and the different	year 9)
human eyewhite light and prismsImage and ray diagrams Concave lenses and magnification (Link to reflection and refraction leading to chemical and electrical effects; photo- sensitive material in the retina and in cameraseffects in absorption and reflectionwaves for detection and exploration.Vaves for detection and retina and in camerasfor cleaning and physiotherapy by ultra- sound; wavesColour/ wavelength (Links to year 9 colour and filters)Image and ray diagramsImage and refrectsImage and refrectsImage a		focusing (qual	litative); the frequencies of light,	Lenses Convex/concave
Light transferring energy from source to absorber(qualitative only); differential colourConcave lenses and magnification (Link to reflection and refraction electrical effects; photo- sensitive material in the retina and in cameraseffects in absorption and effects in absorption and resure wavesVear 9)Colours and the different frequencies of light, white light and prisms (qualitative only);For cleaning and transferring information• Colour/ wavelength (Links to year 9 colour and filters)Ight and prisms (qualitative only);sound; waves transferring information• Black body radiationIght ential colour effects in absorption and diffusefor conversion to electrical signals by• Black body radiation		human eye	white light and prisms	Image and ray diagrams
from source to absorberdifferential colourmagnification (Link toleading to chemical andeffects in absorption andreflection and refractionelectrical effects; photo-diffuse reflectionYear 9)sensitive material in the• Pressure waves• Waves for detection andretina and in camerastransferring energy; useexploration.• Colours and the differentfor cleaning and• Colour/ wavelengthfrequencies of light, whitephysiotherapy by ultra-(Links to year 9 colourlight and prismssound; wavesand filters)(qualitative only);transferring information• Black body radiationdifferential colour effectsfor conversion to• Black body radiation		Light transferr	ring energy (qualitative only);	Concave lenses and
leading to chemical and electrical effects; photo- sensitive material in the retina and in cameraseffects in absorption and diffuse reflectionreflection and refraction Year 9)Vaves for detection and retina and in cameras• Pressure waves transferring energy; use for cleaning and• Waves for detection and exploration.• Colours and the different frequencies of light, white light and prisms (qualitative only);for cleaning and sound; waves transferring information transferring information• Colour/ wavelength (Links to year 9 colour and filters)• Material colour effects in absorption and diffusefor conversion to electrical signals by• Black body radiation		from source to	o absorber differential colour	magnification (Link to
electrical effects; photo- sensitive material in the retina and in camerasdiffuse reflectionYear 9)• Waves for detection and retina and in cameras• Pressure waves transferring energy; use for cleaning and• Colour/ wavelength (Links to year 9 colour and filters)• Colour sond the different frequencies of light, white light and prismsphysiotherapy by ultra- sound; waves• Colour/ wavelength and filters)• (Links to year 9 colour and filters)• Colour (qualitative only);• Transferring information for conversion to electrical signals by		leading to che	effects in absorption and	reflection and refraction
sensitive material in the retina and in camerasPressure waves• Waves for detection and exploration.• Colours and in camerastransferring energy; useexploration.• Colours and the different frequencies of light, white light and prismsfor cleaning and• Colour/ wavelength (Links to year 9 colour and filters)• Qualitative only); differential colour effects in absorption and diffusefor conversion to• Black body radiation		electrical effe	cts; photo- diffuse reflection	Year 9)
retina and in camerastransferring energy; useexploration.• Colours and the differentfor cleaning and• Colour/ wavelengthfrequencies of light, whitephysiotherapy by ultra-(Links to year 9 colourlight and prismssound; wavesand filters)(qualitative only);transferring information• Black body radiationdifferential colour effectsfor conversion to• electrical signals by		sensitive mate	erial in the Pressure waves	Waves for detection and
 Colours and the different for cleaning and clinks to year 9 colour frequencies of light, white physiotherapy by ultra-light and prisms (Links to year 9 colour and filters) (qualitative only); transferring information differential colour effects in absorption and diffuse electrical signals by 		retina and in c	cameras transferring energy; use	exploration.
frequencies of light, whitephysiotherapy by ultra-(Links to year 9 colourlight and prismssound; wavesand filters)(qualitative only);transferring informationBlack body radiationdifferential colour effectsfor conversion toelectrical signals by		Colours and the colours and	ne different for cleaning and	Colour/ wavelength
light and prismssound; wavesand filters)(qualitative only);transferring information• Black body radiationdifferential colour effectsfor conversion to• electrical signals by		frequencies of	f light, white physiotherapy by ultra-	(Links to year 9 colour
(qualitative only); transferring information Black body radiation differential colour effects for conversion to in absorption and diffuse electrical signals by		light and prisn	ns sound; waves	and filters)
differential colour effects for conversion to		(qualitative or	nly); transferring information	Black body radiation
in absorption and diffuse electrical signals by		differential co	lour effects for conversion to	
		in absorption	and diffuse electrical signals by	
reflection microphone		reflection	microphone	

		 Summer P6: Sound frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound Sound needs a medium to travel, the speed of sound in air, in water, in solids Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal Auditory range of humans and animals Pressure waves transferring energy; use for cleaning and physiotherapy by ultra- sound; waves transferring information for conversion to electrical signals by microphone. 		
Electricity and	Summer		Electricity	
Magnetism	P3: Electricity &		Electrical circuits	
	<u>Magnetism</u>		(Progression year 7)	
	Electric Current,		Charge and current	
	measured in amperes, in		(Progression year 7)	
	circuits, series and		Potential difference	
	parallel circuits, currents		(Progression year 7)	
	add where branches		Electrical resistance	
	meet and as flow of		(Progression year 7)	
	charge			

	Potential difference,	Series circuits and	
	measured in volts,	Parallel circuits	
	battery and bulb ratings;	(Progression year 7)	
	resistance, measured in		
	ohms, as the ratio of		
	potential difference (p.d.)		
	to current.		
	Magnetic poles,		
	attraction and repulsion		
	Magnetic fields by		
	plotting with compass,		
	representation by field		
	lines		
	Earth's magnetism,		
	compass and navigation		
	The magnetic effect of a		
	current, electromagnets,		
Space	<u>Space:</u>		
	Planets and the solar		
	system		
	Gravity in Space		
	The night sky, stars and		
	galaxies		
	Days and night		

Building on Prior Key Stage Learning

KS1				
Year 1		Year 2		
Seasonal Change		Forces		
Everyday	Materials	Everyday	Everyday Materials	
Plants and Animals (including humans)		Plants, Living things and their habitats		
KS2				
Year 3	Year 4	Year 5	Year 6	
Light	Sound and Electricity	Earth and Space	Light	
Forces and Magnets	Sound and Electricity	Forces	Electricity	
Rocks	States of Matter	Properties and changes of materials	Properties and changes of materials	

Plants	Living things and their habitats	Living things and their habitats	Living things and their habitats
Animals (including humans)	Animals (including humans)	Animals (including humans)	Animals (including humans)

Post 16

Biology

At Key Stage 5 we follow the OCR syllabus. In year 12, the course starts with the foundations in biology module. This involves looking at the ultrastructure of cells, the structure and function of biological molecules and how they relate to their functions. The structure and function of enzymes and biological membranes and cellular organisation is also explored. Following on from this, student explore the exchange and transport systems in plants and animals, immunity, biodiversity, classification, and evolution. Over the course of the year, students explore a wide range of practical activities linked to the specification including the opportunity to participate in fieldwork. Practical skills such as planning experiments, making qualitative and quantitative observations, processing and presenting data and using it to draw conclusions are revisited throughout the course.

In year 13, the academic rigour increases as students start with an in-depth study of the biochemistry of respiration and photosynthesis. This builds upon their knowledge of biological molecules and processes from Year 12. They look at how organisms respond to and survive in their environment through the study of the nervous system and endocrine systems. Students then look at more detailed genetics including the more recent understanding of epigenetics and how man has harnessed the knowledge of genetics to manipulate organisms using genetic engineering. Students have the opportunity to visit a university laboratory and experiment with PCR testing. The year finishes with the study of ecosystems and population. By the end of the course students can make links between the different hierarchical levels of biology and use this to explain their observations.

Chemistry

The A-level course is taught principally in two streams; physical and theoretical; inorganic and organic. In the first year, physical chemistry starts with refining atomic model of the students with particular attention to the electronic structure -some aspects of quantum chemistry are introduced which will be necessary for later topics in both streams. Other topics within the physical stream develop from those with which the students are already more familiar, e.g., bonding, rates, equilibrium and redox. Concepts such as electrostatic force in intra- and intermolecular forces, energy changes and the particulate nature of matter are used and developed to help students conceptualise the processes. In inorganic chemistry aspects of groups are further studied but incorporating explanations involving the forces at play in the reactions. Organic chemistry introduces homologous series and reaction mechanisms, again aspects of interparticle forces are involved together with some of the quantum chemistry in the formation and shape of molecular orbitals. Practical skills are developed through normal lab work and assessed practical work for the CPAC qualification.

For the second year, physical chemistry starts with thermodynamics introducing the concept of entropy (by building on energy and the random motion built into particulate theory). Rates, equilibria, and electrode potentials follow developing on GCSE and Year 12 topics with the final topic being acids, bases and buffer solutions. The second year of the A-level course develops a number of higher-level mathematical skills (e.g. logarithms for pH) which are taught as necessary. In the inorganic/organic stream the quantum chemistry taught in Year 12 is utilised to explain shapes and colours of transitions metals and the energetics topic to explain complex ion stability. In the organic stream topics include: oxidation products of alcohols, aromatic compounds and their chemical reactions, acid-base nature organics, biological molecules (e.g. proteins and DNA), nmr. In all of these links to the topics studied in the physical stream are emphasised. Towards the end of the course synoptic questions are emphasised to show the interconnectedness of the different streams and parts of the course.

Physics

At Key Stage 5 we follow the OCR syllabus. Students continue to study the central concepts but in greater detail. We aim to produce independent learners with enhanced skills who are ready for the world of university or employment in science related courses and careers.

In year 12, the course starts with the foundations in physics module. This involves looking at the foundations of physics and begins by introducing students to mathematical conventions, that student will use going through the topics. Pupils are then exposed to modules that focus on motion and forces and their affects. Pupils learn about acceleration and can apply these concepts to everyday situations such as gravity. Pupils then begin to apply

knowledge to explain moments, torque, drag and terminal velocity. This is expanded more, and pupils learn about Hooke's law, and explain plastic and elastic deformation, and applies this to stress and strains, where pupils will complete practical's, analyse data, and write valid conclusions.

Over the course of the year, students explore a wide range of practical skills are developed through normal lab work and assessed practical work for the CPAC qualification linked to the specification. Practical skills such as planning experiments, making qualitative and quantitative observations, processing and presenting data and using it to draw conclusions are revisited throughout the course.