Levenshulme High School – Curriculum Map – Science

		Term 1		Term 2		Term 3	
	No. of Weeks	E.g. 8	7	6	6	5	7
Year 7	Topic Title and NC link	Acids, Alkalis & Chemical reactions.	Cells, Tissues and Organs & Reproduction	What a waste & Water	Energy and electrical circuits	Ecology	Space
	Pupils should know… (Core knowledge and concepts to learned)	This unit introduces acids and alkalis. Students learn what they are, why they can be dangerous and how to test their strength. Students move on to learn about chemical reactions and physical changes.	This unit is all about our organ systems and what they are made up of. Students learn about animal and plant cells, the sub-cellular structures inside cells and specialised cells. Students move on to learn about the human reproductive organs, pregnancy, birth, puberty and the menstrual cycle.	In this unit students will learn about how different materials behave and how their understanding of particles helps to explain the behaviour of solids, liquids and gases. They will also learn about different separating techniques and pure and impure substances	This unit uses sustainable living to introduce the idea that stores of energy are needed to make most things happen, and that burning fossil fuels to transfer energy is contributing to global warming. Students also learn about electrical circuits.	This unit looks at the work ecologists do in advising the building industry. Students learn about habitats, adaptations and feeding relationships.	In this unit students will learn about the Earth's place in our solar system, why we have seasons and how we explore space.
	Pupils should be able to do… (Skills being developed)	Describe how to identify acids and alkalis. Explain how to stay safe while doing an experiment. Describe physical and chemical changes.	Describe the similarities and differences between cells Use a microscope to view slides Describe how fertilisation happens	Draw the particle model for the three states of matter. Describe diffusion in terms of particle movement. Explain how distillation produces pure water	Name the different energy stores. Describe renewable and non-renewable energies. Describe electrical circuits.	Describe some environments of habitats Describe food chains in terms of producers, predator etc. Explain how adaptations help organisms to survive.	Describe what a day, month and year is. Explain why we have summer and winter. Compare methods of how we explore space
	Why are we doing this now?	Big Idea All matter is made of particles.	Big Idea Organisms are organised on a cellular basis and	Big Idea All matter is made of particles.	Big Idea The total amount of energy in the	Big Idea Organisms require a supply of energy	Big Idea Our solar system is a very small part of one of billions

	How does it build on prior learning and prepare for knowledge and learning still to come?	From KS2- categorise substances as solids, liquids and gases. This is a lovely start to a students' secondary school Science experience, it allows them hands on Science and also allows their Science teacher to teach them lab safety and also where equipment is kept in the lab. This recurs repeatedly in year nine, year ten and year 11	have a finite life span. From KS2 – describe the changes as humans develop to old age. The human body, how it works and what happens to it as we grow up is extremely important to teach students early in their secondary school experience	From KS2- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating The understanding of Kinetic Theory is fundamental to a lot of the Science the students learn in secondary school. Early introduction to allow challenges to misconceptions allows the layers of more complex ideas to be introduced later in the school.	Universe is always the same but can be transferred from one energy store to another. From KS2 make simple series circuits and name some of the components of a circuit. The idea of energy stores is relatively new therefore we have introduced it early in the students secondary experience to allow it to become embedded before later topics.	and materials for which they often depend on, or compete with, other organisms. From KS2- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. This unit introduces the students to the interdependence of living organisms on each other and how interactions alter the world around us	of galaxies in the Universe. From KS2- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Here we begin to introduce the students to the world around them, why we have night and day, seasons, years, our size in the Universe. It is there first possible introduction into the scale of space around them.
Year 8	**Topic Title and NC link**	Light and Sound.	Digestion and Respiration	Materials, recycling, elements, compounds and mixtures	Heat and Forces	Intermolecular Forces and Bonding	Doctors and Diseases & Future energy
	Pupils should know… (Core knowledge and concepts to learned)	This unit returns to KS2 ideas of light which are extended to how light travels, reflection, refraction, absorption and colour. Students move on to learn about sound as waves, including	This unit covers diet, digestion and the transport of nutrients around the body. Students then move into the study of the chemical reaction for respiration, and how its products are	This unit revisits ideas about elements, compounds and mixtures also how materials are classified. Students will learn how particle models are used	This unit looks at heat transfers, and how objects can be conductors or insulators. This unit looks at weight, drag, magnetic and electromagnetic	This unit will revisit physical and chemical changes. Students will learn about why physical changes happen in terms of intermolecular forces and the reason why solids,	Students are introduced to the work of doctors in prevention of diseases. This includes microbes, disease transmission and disease preventions.

		pitch, frequency and the ear.	transported and used in our bodies.	to represent elements, compounds and mixtures. Students will also learn how to write simple words and symbol equations. Students will examine how to classify and sort into metals and non-metals.	forces, and at drawing free body diagrams.	liquids and gases have similar chemical properties. Students will apply their learning to plastics, what they are, how they are made also the consequences of using them on the environment.	Students aim to build upon knowledge of energy and energy transfers.
	Pupils should be able to do… (Skills being developed)	Define refraction and reflection. Describe how sound waves travel Describe relationship between amplitude, intensity, frequency and pitch	Identify how digested food is transported to the cells. Recall the word equations for respiration Describe how gas exchange takes place in organisms with a single circularity system.	Use particle diagrams to identify the difference between elements, compounds and mixtures. Use evidence to describe how compounds are different from their elements. Write word equations for chemical changes and name reactants and products. Explain what a chemical formula shows Describe the physical properties of metals and non-metals. Describe how we can carry out some tests to	Describe how heat is conducted through materials. Draw free body diagrams to represent forces. Describe what causes air resistance.	State the melting and boiling points of water Use data to determine the melting and boiling points of other materials. Explain what happens to the elements in a chemical reaction. Compare chemical properties before and after a reaction. Apply knowledge of intermolecular forces and bonding to describe the properties of slime. Define a polymer Give some examples of polymers	Define microbe. Describe some ways that microbes can spread disease. State the ways our body defends against disease. Identify energy types Apply knowledge to simple energy pathways diagrams. Recall some advantages and disadvantages of generating electricity through burning fossil fuels.

				distinguish between metals and non-metal. Identify the chemical symbols for some elements using the periodic table		Describe the relationship between a polymer and a monomer Describe how polymerisation works Define non-biodegradable. Describe why this is a problem	
	Why are we doing this now? How does it build on prior learning and prepare for knowledge and learning still to come?	Big Ideas In Science Objects can affect other objects at a distance. Students should know that light is needed to see things (link to shadows), light is reflected, how sounds are made and that they need a medium to travel. This is studied again at KS4	Big Ideas In Science Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms. Students should know that cells carry out respiration in order to produce energy. This is studied again at KS4	Big Ideas In Science All matter is made of particles. Students should be able to categorise substances as solids, liquids and gases and understand ideas about chemical reactions and the difference between physical and chemical changes. This is studied again at KS4	Big Ideas In Science All matter is made of particles. & Objects can affect other objects at a distance. Students should be able to describe why objects fall, how temperature is measured, and how magnets have two poles. These ideas are developed later in KS3 and KS4	Big Ideas In Science Ideas about Science: Science often has ethical and social implications. Students should be able to categorise substances as solids, liquids and gases understand ideas about chemical reactions and be able to draw particle diagrams of solids, liquids and gases. Again this is fundamental to students scientific understanding.	Big Ideas In Science The total amount of energy in the Universe is always the same but can be transferred from one energy store to another. Students should be able to **r**ecall structure and function of components of a bacteria cell and describe energy stores and pathways. Both of these concepts recur throughout KS3 and 4.
	Topic Title and NC link	**Inheritance, Plants and the Reactivity Series**	**Speed and Electricity**	**The Cellular basis of life**	**The Cellular basis of life**	**Particles and structure**	**Science Big Idea: Particles and structure**

Year 9	*Pupils should know… (Core knowledge and concepts to learned)*	Students should know that genetic information is passed down from one generation to another Organisms are organised on a cellular basis All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials Understanding chemical reactions	Students should know that object can affect other objects at a distance Changing the movement of an object requires a net force to be acting on it The total amount of energy in the Universe is always the same, but energy can be transformed The knowledge produced by Science is used in technologies to create products to serve human ends	Students should know cells are the fundamental unit of living organisms. They should also be familiar with sub-cellular structures, and the similarities and differences between plant and animal cells. students should understand the double helix model of DNA and enzymes as biological catalysts. Students should be able to describe and explain respiration and photosynthesis.	Students should be able to describe and explain diffusion particularly in terms of the human gaseous exchange system. Apply their understanding of diffusion to Osmosis and compare these with Active transport.	Students should know the different states of matter and their properties and energy changes required to change them in terms of the particle model. Overlaying this particle model understanding should be an appreciation of the development of knowledge of atomic structure.	Students appreciate the meaning of a pure substance in Science, how to identify them and how the techniques to separate mixtures work. They should also appreciate how the periodic table can be used to predict electron structure and acidity and alkalinity and also the type of bonding that occurs between elements, Students should also be able to construct bonding diagrams.
	Pupils should be able to do… (Skills being developed)	Describe why we have certain characteristics in terms of genes. State which characteristics will show based on the combination of dominant and recessive genes. Describe and explain photosynthesis and respiration. Evaluate data on impacts to the environment.	Describe and calculate what speed and acceleration are Describe how a force can change an object Develop the skill of constructing and interpreting distance/time and speed/time graphs Draw and construct series and parallel circuits and calculate resistance and the applications of electricity	Students should recognise cells as the fundamental unit of living organisms, and using microscopes be able to recognise sub-cellular structures, in plant and animal cells. Be able to use the double helix model to explain DNA structure and the production of proteins. Write	Here students apply similar understanding across a range of different, but connected scenarios. Students should draw comparisons whilst recognising differences	Students use an understanding of Kinetic Theory to explain the behaviour and properties of bulk materials particularly during energy changes. They also consider how Scientific theories change over time as new discoveries are made.	Students should be able to determine techniques for separation from the properties of the chemicals in mixtures and to determine if pure substances have been made. Students should also be able to predict electron structure and properties of elements from their position in the periodic table, they should also be able to

		Describe how particles are arranged in different materials and be able to predict how different chemicals will react.		word and symbol equations to describe respiration and photosynthesis			construct novel dot and cross bonding diagrams in unfamiliar circumstances.
	Why are we doing this now? How does it build on prior learning and prepare for knowledge and learning still to come?	These two sections build on the Science Big Ideas that organisms require a supply of energy and materials for which they often depend and that genetic information is passed down from one generation to the next It builds on work from year 7 and KS2. The topic on Chemical Reactions builds on the Big Idea that all matter in the Universe is built on very small particles and these react together during chemical reactions. All of these concepts are developed in KS4	This is the Science Big Idea that objects can affect other objects at a distance. This work develops the students' mathematical abilities in Science and how numbers can be represented graphically. It also develops the students' ability draw diagrams to describe electrical circuits. This builds on work from year 7 and KS2. These topics are further developed in KS4	This is the Science Big Idea of the cellular basis of life. This learning develops their ideas and links DNA structure to the building of complex organic molecules. It builds on the work of cells from year 7 and organ systems in year 8 linking to KS4 and further work.	This is the Science Big Idea of the cellular basis of life. This work also develops their understanding of the Kinetic Theory of matter and applies it in novel situations. It builds on the work of cells from year 7 and organ systems in year 8 linking to KS4 and further work.	This is the Science Big Idea of Particles and Structure, it builds on the Kinetic Theory model of particles first introduced in year 7, but then introduces a historical timeline to allow the students to appreciate the development of scientific ideas. This idea of th development of Scientific ideas is important throughout their Science study.	This is the Science Big Idea of Particles and Structure. The students have studied elements compounds and mixtures in year 8, this topic extends this understanding and begins to explain the structure of the periodic table from electron structure. Bonding is fundamental to students understanding of the properties of matter and will run through the rest of their learning in Chemistry.
Year 10	**Topic Title and NC link**	**Matter and Forces** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Organism level systems and Community level systems** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Electricity and magnetism Waves and radioactivity** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Chemical reactions and Predicting and identifying reactions and products** *OCR Gateway Science specification - Combined*	**Genes, inheritance and selection** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Monitoring and controlling chemical reactions** *OCR Gateway Science specification - Combined Science A (9-1) - J250*

					Science A (9-1) - J250		
	Pupils should know… (Core knowledge and concepts to learned)	The particle model, how matter changes state, the laws of motion and Newton's laws and the interaction of forces	How the nervous system enables humans and animals to co-ordinate and control their actions from this led into how the endocrine system further enables this co-ordination and homeostasis. Students also need to understand the interaction and interdependence in Ecosystems	How charge and the build up of static electricity are linked. Develop the students understanding of simple circuits and how electricity and magnets are linked. Students understand wave behaviour and how this relates to the electro-magnetic spectrum and from there onto radioactivity	How and why chemical reactions occur and examples of the different types, the role of energy in these reactions, how we use electrolysis and how we can predict the outcome of chemical reactions.	How we inherit our characteristics and the role of genes and the environment in these characteristics. Students should be able to predict the outcome of genetic crosses and explain their thinking. Students should also be able to describe and explain the role of natural selection in evolution.	What factors control the rate of chemical reactions and how we can either speed up or slow down reactions. Students should also know that some reactions are reversible, how a dynamic equilibrium is reached and how the position of equilibrium can be moved by changing the reaction conditions.
	Pupils should be able to do… (Skills being developed)	Students should be able to relate the particle model to everyday real examples including changes of state, the different densities of gases, liquids and solids. Students should also develop their understanding of Newtons laws and the interaction of forces	Students should develop their abilities to see how different systems, both internally and externally interact and how the response of organisms and communities relies on these interactions	Students link how charge moves and how components effect it's flow and are affected by it. Students develop their understanding on the derivation of Physics equations and how wave behaviour can lead to a greater understanding of the electro-magnetic spectrum and radioactivity.	Define chemical reactions, often in terms of electron movement and examine the role energy plays in the type of reaction that occurs. Students move on to linking the role of electricity and electrons in reactions and half equations. and the role of atomic structure and reactivity.	Explain how environmental and genetic factors affect our characteristics. Use and draw genetic cross diagrams to predict the inheritance of characteristics. Explain the role of natural selection and survival of the fittest in evolution. Use characteristics to classify organisms.	Show graphically and calculate rates of reaction. Be able to predict changes to these reaction rates as conditions change. Explain how in reversible reactions equilibrium is reached in a closed system and predict the effect of changing reaction conditions on the position of equilibrium.

	Why are we doing this now? How does it build on prior learning and prepare for knowledge and learning still to come?	These two topics revisit the big ideas of all matter in the Universe is made of very small particles and that objects can affect other objects at a distance and that changing the movement of an object requires a net force to be acting on it. This builds on work in years seven eight and nine and links to later work in KS4 on radioactivity and motion of vehicles	These two topics revisit the big ideas that organisms are organised on a cellular basis and have a finite life span and that they require a supply of energy and materials for which they often depend on, or compete with, other organisms. This builds on work from years seven and nine extending the students understanding and the role of interaction in these systems. This enables the student to move to even more complex interactions in KS5.	These topics revisit the big idea that objects can affect other objects at a distance. This builds on related work in year eight and nine, but extends into building and explaining complex electrical circuits and waves and radioactivity	These topics revisit the big idea that All matter in the Universe is made up of very small particles. This is extending the work covered in years seven and eight and earlier work in KS4. This work is developed further in year eleven and beyond.	These topics revisit the big idea of genetic information is passed down from one generation of organisms to another and the diversity of organisms, living and extinct, is the result of evolution. This extends the work covered in year nine and introduces the idea of evolution and how it occurs.	These topics revisit the big idea of all matter in the Universe is made of very small particles it is further development of work covered in years seven, eight and nine however this now allows the students to predict how the outcome of reactions can be determined by scientists to improve the amount of product produced. This area is further developed in KS5.
Year 11	**Topic Title and NC link**	**Global Challenges for Chemistry** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Energy And Global Challenges for Physics** *OCR Gateway Science specification - Combined Science A (9-1) - J250*	**Global Challenges for Biology** *OCR Gateway Science specification - Combined Science A (9-1) - J250*			
	Pupils should know… (Core knowledge and concepts to learned)	How scientists go about choosing which industrial process is used and how they improve these processes. Students should appreciate how scientists	That energy is contained within stores and that we see the effect when energy moves from one store to another. How we use electricity, how we	How scientists sample organisms in the environment and how they use the information they discover. The effect on biodiversity of a			

		measure these improvements and the role of crude oil in the production of everyday materials. Students should understand how our atmosphere evolved and how pollution is affecting the environment and how water is cleaned to make it safe to drink.	have developed systems to move it around the country and how we attempt to make our use of energy more efficient. How we use our understanding of Physics to make travel safer.	number of different factors. Students should also appreciate how diseases spread, how this is contained and treatments for diseases.			
	Pupils should be able to do… (Skills being developed)	Choose an industrial process to use and explain why they did so. Produce life cycle assessments for products and choose a process based on these. Analyse the positive and negative effects of using crude oil to make materials. Evaluate the use of industrial processes on pollution and the effect of this on the environment. Explain how and why water is treated to make it safe to drink.	Be able to explain the concept of energy stores and energy pathways. Calculate the cost of electricity for everyday items and the methods of making homes and appliances more efficient. Analyse how developments in road safety has reduced risk and explain how the national grid has been developed to move electricity effectively around the country.	Be able to estimate populations of organisms by sampling. Analyse the effects on biodiversity of a range of factors. Evaluate the different techniques for matching food supply to demand. Understand how diseases spread and explain how this spread can be reduced and compare the treatment of different diseases.			
	Why are we doing this now? How does it build on prior learning	This is the big idea of how the composition of the Earth and it's atmosphere, and the processes occurring within them, shape the Earths surface	These topics revisit the big ideas that objects can affect other objects at a distance, that changing the movement of an	These topics revisit the big ideas organisms are organised on a cellular basis and have a finite life span and			

	and prepare for knowledge and learning still to come?	and it's climate. This links much of the content that the students have studied in Chemistry and applies it to the Science of the Earth and it's atmosphere.	object requires a net force to be acting on it and that the total amount of energy in the Universe is always the same, but can be transferred from one energy store to another. This links much of the content that the students have studied in Physics and applies it to everyday situations.	organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms. This links much of the content that the students have studied in Biology and applies it to everyday situations.			