Moor House School & College Curriculum Map

SUBJECT: Science ***YEAR GROUP/PATHWAY: Year 9 Pre-GCSE***			
Autumn 1	**Biology – Cells**	**Biology – Cells**	**Biology – Cells**
Knowledge	Core: Cell Structure	Core: Cell Division	Core: Transport in Plants
Knowledge & Skills	Core – students to demonstrate understanding of: - Eukaryotes and prokaryotes - Animals Cells - Plants Cells - Cell Specialisation - Cell Differentiation - Microscopy (Required Practical)	Core – students to demonstrate understanding of: - Chromosomes - Mitosis & Cell Cycle - Stem Cells in Animals - Stem Cells in Plants	Core: students to demonstrate understanding of: - Diffusion - Surface Area to Volume Ratio - Osmosis (Required Practical) - Active Transport
Vocabulary	Eukaryotes Prokaryotes Plant Cell Animal Cell Membrane Cell Wall Cytoplasm Nucleus Mitochondria Ribosomes Specialisation Differentiation Microscopy	Genetic Material Mitochondria Ribosomes Protein Synthesis Chromosomes Mitosis Stem Cells	Organisation Digestive System Enzyme Optimum pH Amylase Protease Amino Acid Lipase Cardiovascular Capillary Blood Vessels Plasma Arteries Veins Capillaries Coronary Heart Disease
Autumn 2	**Biology – Organisation**	**Biology – Organisation**	**Biology - Organisation**
Knowledge	Core: Principles of Organisation	Core: Animals Tissues, Organs and Organ Systems	Core: Plants Tissues, Organs and Systems
Knowledge & Skills	Core – students to demonstrate understanding of: - Organism Organisation	Core – students to demonstrate understanding of: - The Human Digestive System (Required Practical) - Enzymes - Digestive Enzymes (Required Practical) - Bile - The Heart & Lungs	Core – students demonstrate understanding of: - Plant tissues and Organs - Plant Organ Systems - The Stem - Root Hairs - Stomata

Moor House School & College Curriculum Map

		- Blood Vessels - Blood	
Vocabulary	Organism Organisation	Digestive System Enzyme Optimum pH Amylase Protease Amino Acid Lipase Capillary Blood Vessels Plasma Arteries Veins Capillaries Coronary Heart Disease	Stem Root Hair Cell Stomata Leaf Chloroplasts
Spring 1	**Chemistry – Atomic Structure**	**Chemistry – Atomic Structure**	**Chemistry – Atomic Structure**
Knowledge	Core: A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes	Core: Understanding the Periodic Table	Core: Different parts of the Periodic Table
Knowledge & Skills	Core – students will demonstrate understanding of: - All substances are made of atoms - An atom is the smallest part of an element that can exist - Atoms of each element are represented by a chemical symbol, e.g. 'O' represents an atom of oxygen - There are about 100 different elements - Elements are shown in the periodic table - Compounds are formed from elements by chemical reactions - Chemical reactions always involve the formation of one or more new substances, and often involve a detectable energy change - Compounds contain two or more elements chemically combined in fixed proportions and can be represented by formulae using	Core – students will demonstrate understanding of: - Arrangement of elements in the periodic table - Elements in the same group in the periodic table have the same number of electrons in their outer shell (outer electrons) and this gives them similar chemical properties - Mendeleev overcame some of the problems by leaving gaps for elements that he thought had not been discovered and in some places changed the order based on atomic weights - Elements with properties predicted by Mendeleev were discovered and filled the gaps - Elements that react to form positive ions are metals	Core – students will demonstrate understanding of: - The elements in Group 0 of the periodic table are called the noble gases. They are unreactive and do not easily form molecules because their atoms have stable arrangements of electrons - The noble gases have eight electrons in their outer energy level, except for helium, which has only two electrons - The boiling points of the noble gases increase with increasing relative atomic mass - The elements in Group 1 of the periodic table are known as the alkali metals and have characteristic properties because of the single electron in their outer shell - In Group 1, the reactivity of the elements increases going down the group

Moor House School & College Curriculum Map

	the symbols of the atoms from which they were formed - Chemical reactions can be represented by word equations or equations using symbols and formulae - A mixture consists of two or more elements or compounds not chemically combined together. The chemical properties of each substance in the mixture are unchanged - Mixtures can be separated by physical processes such as filtration, crystallisation, simple distillation, fractional distillation and chromatography. These physical processes do not involve chemical reactions and no new substances are made - Relative electrical charge of particles in atoms - Relative masses of particles in an atom - Electron structural diagrams	- Elements that do not form positive ions are non-metals - The majority of elements are metals - Metals are found to the left and towards the bottom of the periodic table - Non-metals are found towards the right and top of the periodic table	- The elements in Group 7 of the periodic table are known as the halogens and have similar reactions because they all have seven electrons in their outer shell - The halogens are non-metals and consist of molecules made of pairs of atoms - In Group 7, the further down the group an element is, the higher its relative molecular mass, melting point and boiling point - In Group 7, the reactivity of the elements decreases going down the group.
Vocabulary	Atoms Elements Protons Neutrons Electrons Ion Isotopes Atomic Mass Atomic Weight	Periodic Table Elements Ion Isotopes Metals Non-Metals	Noble Gases Halogens

Spring 2	Chemistry – Bonding, Structure and Properties of Matter	Chemistry – Bonding, Structure and Properties of Matter	Chemistry – Bonding, Structure and Properties of Matter
Knowledge	Core: Chemical bonds, ionic, covalent and metallic	Core: How bonding and structure are related to the properties of substances	Core: Structure and bonding of carbon

Moor House School & College Curriculum Map

Knowledge & Skills	Core – students will demonstrate understanding of: - There are three types of strong chemical bonds: ionic, covalent and metallic - Ionic bonding occurs in compounds formed from metals combined with non-metals - Covalent bonding occurs in non-metallic elements and in compounds of non-metals - Metallic bonding occurs in metallic elements and alloys - When a metal atom reacts with a non-metal atom, electrons in the outer shell of the metal atom are transferred - Metal atoms lose electrons to become positively charged ions - Non-metal atoms gain electrons to become negatively charged ions - The electron transfer during the formation of an ionic compound can be represented by a dot and cross diagram - An ionic compound is a giant structure of ions - Ionic compounds are held together by strong electrostatic forces of attraction between oppositely charged ions - When atoms share pairs of electrons, they form covalent bonds. These bonds between atoms are strong - Covalently bonded substances may consist of small molecules - Some covalently bonded substances have very large molecules, such as polymers - Some covalently bonded substances have giant covalent structures, such as diamond and silicon dioxide	Core – students will demonstrate understanding of: - The three states of matter are solid, liquid and gas - The amount of energy needed to change state from solid to liquid and from liquid to gas depends on the strength of the forces between the particles of the substance - The stronger the forces between the particles, the higher the melting point and boiling point of the substance - In chemical equations, the three states of matter are shown as (s), (l) and (g), with (aq) for aqueous solutions - Ionic compounds have regular structures (giant ionic lattices) in which there are strong electrostatic forces of attraction in all directions between oppositely charged ions - These compounds have high melting points and high boiling points because of the large amounts of energy needed to break the many strong bonds - When melted or dissolved in water, ionic compounds conduct electricity because the ions are free to move and so charge can flow - Substances that consist of small molecules are usually gases or liquids that have relatively low melting points and boiling points - These substances have only weak forces between the molecules (intermolecular forces). It is these intermolecular forces that are overcome, not the covalent bonds, when the substance melts or boils	Core – students will demonstrate understanding of: - In diamond, each carbon atom forms four covalent bonds with other carbon atoms in a giant covalent structure, so diamond is very hard, has a very high melting point and does not conduct electricity# - In graphite, each carbon atom forms three covalent bonds with three other carbon atoms, forming layers of hexagonal rings which have no covalent bonds between the layers - In graphite, one electron from each carbon atom is delocalised - Graphene is a single layer of graphite and has properties that make it useful in electronics and composites - Fullerenes are molecules of carbon atoms with hollow shapes. - Carbon nanotubes are cylindrical fullerenes with very high length to diameter ratios. Their properties make them useful for nanotechnology, electronics and materials

Moor House School & College Curriculum Map

		- The intermolecular forces increase with the size of the molecules, so larger molecules have higher melting and boiling points - These substances do not conduct electricity because the molecules do not have an overall electric charge - Polymers have very large molecules. The atoms in the polymer molecules are linked to other atoms by strong covalent bonds - The intermolecular forces between polymer molecules are relatively strong and so these substances are solids at room temperature - Substances that consist of giant covalent structures are solids with very high melting points - All of the atoms in these structures are linked to other atoms by strong covalent bonds. These bonds must be overcome to melt or boil these substances - Metals have giant structures of atoms with strong metallic bonding. This means that most metals have high melting and boiling points - In pure metals, atoms are arranged in layers, which allows metals to be bent and shaped - Pure metals are too soft for many uses and so are mixed with other metals to make alloys which are harder - Metals are good conductors of electricity because the delocalised electrons in the metal carry electrical charge through the metal	

Moor House School & College Curriculum Map

		- Metals are good conductors of thermal energy because energy is transferred by the delocalised electrons	
Vocabulary	Compounds Mixtures Alloys Monomers Polymers	Solid Liquid Gas	Graphite Fullerene Carbon
Summer 1	**Physics - Energy**	**Physics - Energy**	**Physics - Energy**
Knowledge	Core: Energy changes in a system, and the ways energy is stored before and after such changes	Core: Conservation and dissipation of energy	Core: National and global energy resources
Knowledge & Skills	Core – students to demonstrate understanding of: - The changes involved in the way energy is stored when a system changes - Calculations to include work done by forces and when a current flows - The amount of energy associated with a moving object, or stored by an object can be calculated - Calculations to include kinetic energy, elastic potential energy and gravitational potential energy - Equations for kinetic energy and gravitational potential energy should be known - The distribution of energy in a system can change. This change can be calculated - The specific heat capacity of a substance is the amount of energy required to change the temperature of one kilogram of the substance by one degree Celsius. - $E = m \times c \times \Delta\theta$	Core – students to demonstrate understanding of: - The total amount of energy in a system remains constant though the way the energy is stored in the system can change - The energy transfers in a system are not always useful - Energy that is transferred in a way that is not considered useful is often described as being wasted - Reducing unwanted energy transfers - Reducing heat loss from a home by use of insulation - Calculating efficiency - How to increase efficiency - Equations for the efficiency of an energy transfer should be known	Core – students to demonstrate understanding of: - Renewable and non-renewable energy resources

Moor House School & College Curriculum Map

	- The power rating of an appliance states the rate that energy is being transferred or the rate at which work is done - Equations for power as the rate of transfer of energy or work done should be known		
Vocabulary	Energy	Energy Wasted Energy Useful Energy Energy Transfer Energy Efficiency	Energy Resources Renewable Energy Non-Renewable Energy
Summer 2	**Physics – Forces**	**Physics – Forces**	**Physics – Forces**
Knowledge	Core: Forces and their Interactions	Core: Forces and Elasticity	Core: Forces in Motion
Knowledge & Skills	Core – students to demonstrate understanding of: - Scalar and vector quantities - Contact and non-contact forces - Weight and gravitational field - Calculating the weight of an object - Equation for calculating the weight of an object should be known - Resultant force - Free body diagrams	Core – students to demonstrate understanding of: - Changing the shape of an object - Elastic and inelastic deformation - Hooke's Law - Equation relating the force applied to a spring and its extension should be known - Work done in stretching a spring	Core – students to demonstrate understanding of: - Distance and displacement - The definition of speed, how it is calculated and some typical values - Calculating the distance travelled by an object from its speed - Equation for distance travelled should be known - Definition of velocity - Distance-time graphs - Definition and calculation of acceleration - Equation for acceleration should be known - Velocity-time graphs - Equations of motion for uniform acceleration - Falling under gravity - Newton's First Law and the consequences of it - Newton's Second Law - Equation for Newton's Second Law should be known

Moor House School & College Curriculum Map

			- Newton's Third Law - Thinking distance, braking distance and stopping distance - Reaction times and thinking distance - Braking distance - Energy transfers when stopping
Vocabulary	Scalar Vector Contact Non-Contact Gravitational Field Resultant Force	Work Done Joule Hooke's Law	Distance Displacement Velocity Speed Acceleration Thinking Distance Stopping Distance Braking Distance Reaction Time