SCIENCE Year 9 Curriculum End Points and Key Vocabulary

	Autumn Term 1	Autumn Term 2	Spring Term 1	Spring Term 2	Summer Term 1	Summer Term 2
Ethos Links	**STEM** – Generating electricity, insulating houses **Sustainability** – Renewable and non-renewable energy	**STEM** – Generating electricity, insulating houses **Sustainability** – Renewable and non-renewable energy	**STEM** – Explaining how organisms work, cell replication. Looking at the design of the microscope and how this was developed. How stem cells are used.	**STEM** – Using models to explain observations. How theories change over time and using experimental evidence to develop theories	**STEM** – Calculations, using electricity and building circuits. Using thermistors and LDRs in alarms and designing circuits to make use of these **Sustainability -** Making systems more efficient	**STEM**- How materials behave, uses of polymers, what causes the properties of a substance (melting point, conductivity etc), uses and applications of nanotechnology **Sustainability** – Environmental implications of nanotechnology
Learning End Points	**Working Scientifically Project – Energy (P)** By the end of this unit students will know and understand: ➢ What is meant by a system and the different energy stores ➢ The conservation of energy and the pathways through which energy is transferred	**Working Scientifically Project – Energy (P)** By the end of this unit students will know and understand: ➢ What is meant by a system and the different energy stores ➢ The conservation of energy and the pathways through which energy is transferred	**Organisms – Cell Biology (B)** By the end of this unit students will know and understand: ➢ The relative size of prokaryotes and eukaryotes, what organelles are present in each and their functions ➢ The key parts of a light microscope,	**Matter – Atomic Structure and the Periodic Table (C)** By the end of this unit students will know and understand: ➢ That atoms and elements are represented by chemical symbols, and these are found on the periodic table.	**Electromagnets – Electricity (P)** By the end of this unit students will know and understand: ➢ How to draw and interpret circuit diagrams using standard circuit symbols ➢ What is meant by charge, current, potential	**Matter – Bonding, Structure and the Properties of Matter (C)** By the end of this unit students will know and understand: ➢ How atoms form chemical bonds through transfer or sharing of electrons ➢ How ionic, covalent and

	➢ How to reduce wasted energy ➢ Where humans get their energy from, and how energy from food can be transferred from the chemical store to the thermal store ➢ The words accurate, precise, reproducible, repeatable, resolution and anomaly ➢ The errors random and systematic, the effects of these errors and how they can be reduced ➢ The equation work done = force*displacement, and can use to it calculate all three quantities. ➢ How to calculate power, energy and time using the equation P=Et ➢ What is meant by efficiency and how it can be calculated and compared ➢ How to use and manipulate the equations; $E_k=0.5mv^2$, $E_p=mgh$,	➢ How to reduce wasted energy ➢ Where humans get their energy from, and how energy from food can be transferred from the chemical store to the thermal store ➢ The words accurate, precise, reproducible, repeatable, resolution and anomaly ➢ The errors random and systematic, the effects of these errors and how they can be reduced ➢ The equation work done = force*displacement, and can use to it calculate all three quantities. ➢ How to calculate power, energy and time using the equation P=Et ➢ What is meant by efficiency and how it can be calculated and compared ➢ How to use and manipulate the equations; $E_k=0.5mv^2$, $E_p=mgh$,	how they have developed over time and why they are important, comparing them to electron microscopes ➢ How cells are adapted to their function ➢ How and when plant and animal cells differentiate. ➢ How bacteria cells divide ➢ How to prepare an uncontaminated culture using aseptic technique ➢ What chromosomes are and where they are found ➢ How cells divide using mitosis ➢ What stem cells are and where they are found, and the function of them in embryos, adult humans and in the meristem of plants.	➢ What atoms, elements, compounds and molecules are. ➢ What a mixture is and how they can be separated depending on physical properties ➢ How research led to the development of the model of the atom, and the stages of this model to the current model used now, including the models by Thompson, Bohr, Rutherford and Chadwick. ➢ How Rutherford's alpha scattering experiment led to changes in the atomic model. ➢ The relative mass, charge and position of the 3 subatomic particles ➢ How the numbers of protons,	difference and resistance ➢ The relationships described by Q = It and V=IR ➢ The factors affecting resistance ➢ The relationships between current and potential difference in a fixed resistor, filament lamp and diode. ➢ How temperature affects resistance in a thermistor and how light intensity affected resistance in an LDR, and applications of them ➢ Current, potential difference and resistance in series and parallel circuits. ➢ The current, potential difference and frequency of	metallic bonds are formed ➢ The properties of ionic compounds and how these relate to the structure ➢ The properties of solids, liquids and gases and how these relate to the strength of forces between the particles of the substance ➢ How to use state symbols in an equation ➢ The properties of simple covalent structures and how these relate to the structure ➢ How polymers are formed and how their structure is represented by a diagram ➢ The properties of diamond, graphite and silicon dioxide, and how these relate to their structure

	$E_e=0.5ke^2$ to calculate any quantity in the formula ➢ How energy is transferred from hot to cold areas, and how this happens ➢ What thermal conductivity is and how this can be used to choose insulating materials ➢ What specific heat capacity is and how to calculate it using $\Delta E = mc\Delta\theta$ ➢ How energy transfers can be reduced in a house ➢ How electricity is generated to meet global demand from renewable and non-renewable resources, and the advantages and disadvantages of each	$E_e=0.5ke^2$ to calculate any quantity in the formula ➢ How energy is transferred from hot to cold areas, and how this happens ➢ What thermal conductivity is and how this can be used to choose insulating materials ➢ What specific heat capacity is and how to calculate it using $\Delta E = mc\Delta\theta$ ➢ How energy transfers can be reduced in a house ➢ How electricity is generated to meet global demand from renewable and non-renewable resources, and the advantages and disadvantages of each	➢ How stem cells can be used in medical treatments and food production and the ethical issues surrounding this. ➢ How substances move into and out of cells using diffusion, and the factors which affect the rate of this. ➢ How surfaces and organs are specialised for exchange in multicellular organisms ➢ What osmosis is and when it happens ➢ What active transport is and when it happens	neutrons and electrons is calculated. ➢ How electrons are arranged in atoms ➢ How the periodic table is arranged, and what formats this took in the past, as well as what led to the changes. ➢ How metals form positive ions, and non-metals form negative ions ➢ The differences between the chemical and physical properties of metals and non-metals ➢ Why the elements in group 0 are unreactive and what they are used for ➢ The chemical and physical properties of group 1 and group 7 elements, uses	mains electricity in the UK ➢ The difference between AC and DC ➢ The key components of a 3 pin plug ➢ How to use the equations $P=VI$ and $P=I^2R$, calculating power, current, potential difference and resistance ➢ How power is related to potential difference and current, and energy transferred ➢ What is meant by the national grid, including the role of step up and step down transformers ➢ What causes static charge ➢ How an electric field is formed and how two electric fields interact.	➢ The properties of metals and alloys and how these relate to their structure ➢ The properties and uses of graphene ad fullerenes, and how these relate to their structure ➢ Uses and properties of nanoparticles

				of them, and how this relates to their electronic configuration ➢ The properties and uses of transition metals		
Key Vocabulary	Energy Dissipate Efficiency Power Kinetic energy Elastic potential Accurate Precise Specific heat capacity	Energy Dissipate Efficiency Power Kinetic energy Elastic potential Accurate Precise Specific heat capacity	Diffusion Osmosis Active transport Stem cell Differentiation Prokaryote Eukaryote	Element Atom Ion Mixture Periodic Table Proton Neutron Electron Nucleus Transition metal	Current Potential difference Resistance Charge Electric field Thermistor Work done Coulomb Component Frequency Power National grid	Ionic Covalent Metallic Alloy Chemical bond Nanoparticle Fullerene Diamond Graphite Silicon dioxide Giant lattice