Science

Inspiring young scientists of the futures, atom by atom

Science surrounds us. It is everywhere in our daily lives - all day, every day! We want Science to inspire students to explore the world around them and recognise and understand this. We aim to excite and enrich with the practical applications of the subject, teaching students that doing science develops our ability to ask questions, collect information, organise and test our ideas, problem-solve and apply what we learn.

Science is a platform for building confidence, developing communication skills, and making sense of the world around us.

	Autumn		Spring		Summer	
B	Inheritance and evolution	Big ideas in science	Cells (Cell structure)	Cells (Transport/ cell division)	Organisation (Animals)	Organisation (Plants/ enzymes)
C	Forces and their effects- speed / gravity / pressure	Big ideas in science	Fundamentals/ Changes of state /Separation techniques	Atomic structure/ Periodic table	Bonding	Structure and properties
P	Magnets and electromagnets	Big ideas in science	Energy	Electricity	Electricity	Particle model

Science homework is an integral part of each students learning journey. Therefore the Science department will issue regular homework.
The homework set is designed to:

- Consolidate learning
- Allow further research on subjects
- Develop and practise essential scientific skills
- Provide extra challenge and support for students

Students will be set two pieces of homework per week. One piece will be based on the current learning and the second homework will be a piece of recall work to consolidate previous topic and aid revision. Students studying separate sciences will receive three pieces of homework per week but of a shorter duration.

Homework is not expected to be completed in isolation and we actively encourage parents or any other person to help and support students while completing the tasks set. If a student is having difficulty completing homework they must bring this to the attention of their class teacher who will arrange a time suitable to go over any problem areas.


KS4
Literacy in Science
This week's article:
MOTIC SFC-100 SERIES

Unit	Learning Objectives/Outcomes
Inheritance and Evolution	• The variation between species and individuals of the same species means some organisms compete more successfully which can drive natural selection • Explain whether characteristics are inherited, • environmental or both. • Explain the advantages and disadvantaged of selective breeding / cloning / genetic engineering. • Heredity as the process by which genetic information is transmitted from one generation to the next. • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. • Differences between species • The variation between species and individuals of the same species means some organisms compete more successfully which can drive natural selection • Changes in the environment may lead to individuals within a species and entire species less well adapted to compete successfully and reproduce which in turn leads to extinction • The variation between species and individuals of the same species means some organisms compete more successfully which can drive natural selection • Changes in the environment may lead to individuals within a species and entire species less well adapted to compete successfully and reproduce which in turn leads to extinction • The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material
Forces and their effects- speed/ gravity/pressure	• Explain how forces affect the speed of an object • Use given equations to calculate speed • Analyse speed distance time graphs • Simple machines give bigger force but at the expense of smaller movement (and vice versa): product force and displacement unchanged • Moment as the turning effect of a force • Force-extension linear relation; Hooke's Law as a special case • Atmospheric pressure, decreases with increase of height as weight of air above decreases with height • Pressure in liquids, increasing with depth; upthrust effects, floating and sinking • Pressure measured by ratio of force over area – acting normal to any surface

Magnets and electromagnets	• Explain why distance between magnets changes the force • Investigate the field lines around attracting and repelling magnets • Explain how the earth's magnetic field aids navigation • Explain how an electromagnet works. (link to earth's magnetic field) • Investigate factors that affect the strength of an electromagnet • Explain the choice of electromagnet or permanent magnet for a devise • Explain the choice of electromagnets or permanent magnets for a device in terms of their Properties. • Suggest how bells, circuit breakers and loudspeakers work • Use a diagram to explain how an electromagnet can be made and how to change its strength.
Cells (structure)	• Plant and animal cells (parts and functions) • Bacterial cells • Specialised cells • Cell division (mitosis) • Microscopy and magnification • Culturing microorganisms (BIOL ONLY)
Cells (Transport/ cell division)	• Chromosomes • Cell division- mitosis and meiosis • Stem cells • Transport in plants • Diffusion • Osmosis • Active transport
Organisation (Animals)	• Digestive system • Process of digestion • Role of enzymes in digestion • Role of bile in digestion • Heart and blood vessels • The blood • Heart disease
Organisation (Plants/enzymes)	• plant organisation • Human digestive system • Role of enzymes in digestion • Heart/circulatory system • Blood vessels • Composition of blood • Non communicable disease- coronary heart disease • Health issues • Effect of lifestyle on some no communicable diseases. • Cancer

Fundamentals / Separation techniques	• Elements, mixtures & compounds • Word equations, chemical symbols and formula, balanced symbol equations • Mixtures • Techniques to include filtration, crystallisation, simple distillation, fractional distillation, chromatography • State symbols • States and particle models • State symbols • States and particle models • Changes of state in terms of energy and forces • Predict state of a substance from data
Atomic structure / Periodic table	• Subatomic particles, charges and mass • Calculating subatomic particles • Electron arrangements • Size of atoms • Development of atomic theory (Dalton, Thomson, Rutherford, Bohr, Chadwick) • Details of plum pudding model and alpha scattering experiment • The varying physical and chemical properties of different elements. • The Periodic Table periods and groups: metals and non-metals. • The properties of metals and non-metals. • The principles underpinning the Mendeleev Periodic Table. • How patterns in reactions can be predicted with reference to the Periodic Table.
Bonding and structures (Ionic, covalent, metals)	• Why bonding occurs, ion formation, ionic bonding, properties of ionic substances • Covalent bonding, dot and cross diagrams, properties of simple covalent molecules • Metallic bonding, properties of metals • Properties of diamond, graphite, silicon dioxide and graphene • Properties of metals and alloys • Properties of polymers

Energy	• Energy when systems change/Energy transfers • Work done by forces and when current flows • Calculating kinetic energy/elastic potential energy/gravitational potential energy/thermal energy changes • Specific heat capacity • Power • Reducing wasted energy • Thermal conductivity • Energy efficiency • Energy resources- Renewable and non-renewable energy
Electricity	• Current, potential difference and resistance • Electrical charge and current • Resistors • Series and parallel circuits • Domestic uses and electrical safely • Mains electricity • Standard circuit symbols • Electric current • Calculating charge flow • Relationship between current, voltage and resistance • Potential difference • Resistors, Thermistors and LDRs • Series and parallel circuits • Alternating current and direct current • Mains electricity • Plugs • Energy transfers and power • Energy transfers in appliances • National grid • Static electricity (Physics) • Electric fields (Physics)
Particle model	• Solids, liquids, gases • Changes of state