

Science

Building Curiosity One Atom at a Time

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.

Group	Autumn		Spring		Summer	
B	Photosynthesis	Circulatory system	Digestion / biological molecules	Cellular respiration	Nervous system	Genetics and inheritance
C	Periodic table	Bonding & structures & Nanoscience	Rates of reaction Quantitative chemistry	Metals and reactions Acids, bases and salts	Organic chemistry	Electrolysis Energy changes
P		Electricity	Calculating energy changes	Solar system	Waves	Speed, distance time graphs, forces and motion

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.

Unit	Learning Objectives/Outcomes
Photosynthesis	<ul style="list-style-type: none"> • Process of photosynthesis • Rate of photosynthesis • Uses of glucose
Circulatory system	<ul style="list-style-type: none"> • Heart and blood vessels • The blood • Heart disease
Digestion / biological molecules	<ul style="list-style-type: none"> • Digestive system • Process of digestion • Role of enzymes in digestion • Role of bile in digestion
Cellular respiration	<ul style="list-style-type: none"> • Aerobic and anaerobic respiration • Response to exercise • Metabolism
Nervous system	<ul style="list-style-type: none"> • Homeostasis • Human nervous system • The brain • Control of body temp • Human endocrine system • Control of blood glucose • Maintaining water and nitrogen levels • Plant hormones • Hormones in reproduction • Contraception • Hormones to treat infertility • Negative feedback
Genetics and inheritance	<ul style="list-style-type: none"> • Reproduction – sexual and asexual • Advantages and disadvantages of sexual and asexual reproduction • DNA • Structure of DNA • Protein synthesis • Genetic inheritance • Inherited disorders • Sex determination • Mendel and genetics
Periodic table	<ul style="list-style-type: none"> • Arrangement of table, history of development • Metals and non-metals • Group 0 properties • Group 1 properties, reactions and reactivity • Group 7 properties, reactions and reactivity

	<ul style="list-style-type: none"> • Transition metals
Bonding & structures	<ul style="list-style-type: none"> • Properties of diamond, graphite, silicon dioxide and graphene • Properties of metals and alloys • Properties of polymers
Nanoscience	<ul style="list-style-type: none"> • Nanoparticles size and applications
Rates of reaction	<ul style="list-style-type: none"> • Relative mass • Conservation of mass • Moles (HIGHER) • Reacting masses (HIGHER) • Limiting reactants (HIGHER) • Concentration • Percentage yield and atom economy • Titration calculations • Gas volumes
Quantitative chemistry	<ul style="list-style-type: none"> • Reactivity of metals • Oxidation and reduction • Oxidation and reduction in terms of electrons (HIGHER) • Reactivity series • Displacement • Extracting metals
Metals and reactions Acids, bases and salts	<ul style="list-style-type: none"> • pH scale, neutralisation • reactions of acids with metals, bases, alkalis • Salt formation • Soluble salts • REQUIRED PRACTICAL • Neutralisation equation • Titrations • REQUIRED PRACTICAL • Strong and weak acids
Organic chemistry	<ul style="list-style-type: none"> • Fractional distillation • Cracking • Hydrocarbons and properties • Alkanes and alkenes • Reactions of alkenes • Alcohols (HIGHER) • Carboxylic acids (HIGHER) • Addition polymerisation, condensation polymerisation • Amino acids
Electrolysis	<ul style="list-style-type: none"> • Electrolysis theory • Electrolysis of molten ionic compounds • Half equations • Electrolysis of aqueous substances • REQUIRED PRACTICAL • Electrolysis to extract aluminium

Energy Changes	<ul style="list-style-type: none"> • Exothermic and endothermic reaction theory • Uses of exo/endo reactions • Reaction profiles • Calculating energy changes (HIGHER) • Chemical cells and fuel cells REQUIRED PRACTICAL
Electricity	<ul style="list-style-type: none"> • 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)
Calculating energy changes	<ul style="list-style-type: none"> • Density of materials • Particle model diagrams • Changes of state • Internal energy of systems • Temperature changes and specific heat • Specific latent heat
Solar system	<ul style="list-style-type: none"> • Our solar system • Life cycle of a star • Orbital motion • Satellites • Red shift • Big Bang theory • Evidence for Big Bang theory
Waves	<ul style="list-style-type: none"> • Transverse and longitudinal waves • Wave diagrams • Calculating wave frequency • Wave speed • Measuring speed of waves • Reflection of waves and ray diagrams (Physics) • Sound waves (Physics) • Hearing • Ultrasound and uses (Physics) • Electromagnetic waves and spectrum • Refraction • Properties of EM waves • Uses of EM waves • Lenses (Physics)

	<ul style="list-style-type: none"> • Convex and concave lenses (Physics) • Lenses and ray diagrams (Physics) • Magnification (Physics) • Colours and filters • Emission and absorption of infrared radiation • Radiation and temperature
<p>Speed, distance time graphs, forces and motion</p>	<ul style="list-style-type: none"> • Distance and displacement • Speed • Average speed • Velocity • Distance time graphs • Acceleration • Velocity time graphs • Terminal velocity • Resultant forces and motion (Newton's first law) • Newton's second law ($f=ma$) • Newton's third law • Stopping distances • Factors affecting braking distance • Momentum (HT) • Conservation of momentum (HT) • Changes in momentum