Science – Year 9

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 9	**Topics: Cell structure and transport, Atomic structure, The periodic table** **Knowledge:** The world of the microscope Animal and plant cells RP: Looking at cells Eukaryotic and prokaryotic cells Specialisation in animal cells Specialisation in plant cells Diffusion Osmosis Osmosis in plants RP: Investigating osmosis in plant cells Active transport Exchanging materials Atoms Chemical equations Separating mixtures Fractional distillation and paper chromatography History of the atom Structure of the atom Ions, atoms, and isotopes	**Topics: Cell division, Conservation and dissipation of energy, Energy transfer by heating, Energy resources** **Knowledge:** Cell division Growth and differentiation Stem cells Stem cell dilemmas Changes in energy stores Conservation of energy Energy and work Gravitational potential energy stores Kinetic energy and elastic energy stores Energy dissipation Energy and efficiency Electrical appliances Energy and power Energy transfer by conduction RP: Testing sheets of material as insulators (Triple only) Infrared radiation (Triple only)	**Topics: Structure and bonding, Organisation and the digestive system** **Knowledge:** States of matter Atoms into ions Ionic bonding Giants ionic structures Covalent bonding Structure of simple molecules Giant covalent structures Fullerenes and graphene Bonding in metals Giant metallic structures Nanoparticles (Triple only) Applications of nanoparticles (Triple only) Tissues and organs The human digestive system The chemistry of food RP: Food tests Catalysts and enzymes Factors affecting enzyme action	**Topics: Organising animals and plants, Communicable diseases** **Knowledge:** The blood The blood vessels The heart Helping the heart Breathing and gas exchange Tissues and organs in plants Transport systems in plants Evaporation and transpiration Factors affecting transpiration Health and disease Pathogens and disease Growing bacteria in the lab (Triple only) Preventing bacterial growth (Triple only) RP: Analysing bacterial growth (Triple only) Preventing infections Viral diseases Bacterial diseases Diseases caused by fungi and protists	**Topics: Preventing and treating diseases, Non-communicable diseases, Chemical calculations** **Knowledge:** Vaccination Antibiotics and painkillers Discovering drugs Developing drugs Making monoclonal antibodies (Triple only) Uses of monoclonal antibodies (Triple only) Non-communicable diseases Cancer Smoking and the risk of disease Diet, exercise, and disease Alcohol and other carcinogens Relative masses and moles Equations and calculations From masses to balanced equations The yield of a chemical reaction (Triple only) Atom economy (Triple only) Expressing concentrations Titrations (Triple only)	**Topics: Electric circuits, Electricity in the home, Photosynthesis (Triple only)** **Knowledge:** Electrical charges and fields (Triple only) Current and charge Potential difference and resistance RP: How does the resistance of a wire depend on the length? Component characteristics RP: Investigating different components Series circuits Parallel circuits RP: Testing resistors in series and parallel Alternating current Cables and plugs Electrical power and potential difference Electrical currents and energy transfer Appliances and efficiency Photosynthesis (Triple only)

	Electronic structures Development of the periodic table Electronic structures and the periodic table Group 1 – the alkali metals Group 7 – the halogens Explaining trends The transition elements (Triple only) **Skills:** Calculate the number of protons, neutrons, and electrons for different elements Naming apparatus Making scientific drawings **Assessments:** Atomic structure and the periodic table Test	More about infrared radiation Specific heat capacity RP: Measuring specific heat capacity Heating and insulating buildings Energy demands Energy from wind and water Power from the Sun and the Earth Energy and the environment Big energy issues **Skills:** Making scientific drawings Evaluating stem cells Independent, dependent and control variables Explaining differences between waves Stating the resolution Using a manual or digital scale Explaining why certain apparatus is used Bar chart **Assessments:** Cell biology Test Energy Test	How the digestive system works RP: The effect of pH on the rate of reaction of amylase Making digestion efficient (Triple only) **Skills:** Writing a method Reproducibility and repeatability Following a given method Following a given risk assessment Writing a risk assessment (hazards, risks, precautions) Explaining properties of types of bonding Reproducibility and repeatability **Assessments:** Bonding, structure, and properties of matter Test	Human defence responses More about plant diseases (Triple only) Plant defence responses (Triple only) **Skills:** Plot and interpret scatter graphs showing data about health and diseases Analyse data health from frequency tables and histograms Using a given result table Spotting errors (random, systematic, zero errors) Identifying trends in data from graphs. Independent, dependent and control **Assessments:** Organisation Test	RP: Carrying out a titration (Triple only) Titration calculations Volumes of gases **Skills:** Plot and interpret scatter graphs showing data about health and diseases Analyse data health from frequency tables and histograms Using a given result table Writing a method Reproducibility and repeatability Following a given method Following a given risk assessment Writing a risk assessment (hazards, risks, precautions) **Assessments:** Infection and response Test Quantitative chemistry Test	The rate of photosynthesis (Triple only) RP: Light intensity and rate of photosynthesis (Triple only) How plants use glucose Making the most of photosynthesis **Skills:** Draw electrical circuits and circuit symbols. Writing a method for ecological techniques Using and rearranging equations Naming apparatus Using a manual or digital scale Sketch graph Suggest explanations for the conclusion **Assessments:** Electricity Test Oasis Science Mock (June/July): One June/July series paper from previous year (either biology, chemistry, or physics)