Year 7	UNIT TITLES	Learning Objectives	Assessment
Science **2019** **Autumn Term 1** **Sept – Oct**	**Safety and working scientifically** An introduction to safety and equipment in the laboratory **Particle model of solids, liquids, gases and solutions** Three States of Matter Changing States, Diffusion and Solubility	**Pupils will learn:** • To identify the hazard symbols • How to use the laboratory equipment **Pupils will learn:** • To identify and understand the difference between the three states of matter • To be able to understand dissolving and diffusion • Model particles of elements, compounds and mixtures	**End of topic test**
Autumn Term 2 **Oct - Dec**	**Cells** Plant and Animal Cells Specialised Cells	**Pupils will learn:** • To be able to identify different parts of cells and their function • To identify specialised cells • How to use a microscope and to prepare a specimen slide and calculate magnification • To explain the difference between unicellular and multicellular • The differences between cells, tissues and organs and organ systems	**End of topic test**
Spring **Term 1** **Jan - Feb**	**Reproduction** Plant Reproduction Animal Reproduction	**Pupils will learn:** • The functions of the male and female reproductive organs • To write an account of animal/plant reproduction process • To compare gestation periods in different animals • To explain the role of the placenta and umbilical cord • To describe the stages of the menstrual cycle	**End of topic test**
Spring **Term 2** **Feb - Apr**	**Acids and Alkalis** Indicator, pH, Neutralisation Reaction of Acids Combustion of Fuels	**Pupils will learn:** • To describe how chemical reactions are used to make new materials • To be able to account for the reactions of acids • To understand combustion and represent this chemically • To explain the pH scale and how neutralisation is used in day to day life – indigestion, insect stings and tooth decay • To make a salt using acid and alkali	**End of topic test**

Summer **Term 1** **Apr - May**	**Forces, Energy and Electricity** Different forces and their uses Electrical Safety Series and Parallel Circuits Generating electricity Renewable and Non-renewable energy sources Food as a Fuel	**Pupils will learn:** • To be able to identify different forces and their effects • To calculate speed and acceleration • To be able to construct circuits accurately and safely • To be able to understand and identify different energy sources • To understand that humans also have energy requirements and these differ from one individual to the next • To construct energy transfer diagrams	**End of topic test**
Summer **Term 2** **May - Jul**	**Pure and impure Substances** Separating techniques of mixtures	**Pupils will learn:** • To be able to explain in terms of particles, what is happening when state changes occur • To explain how to use filtering, evaporating, distillation and chromatography	**End of topic test**

Year 8	UNIT TITLES	Learning Objectives	Assessment
Science **2019** **Autumn Term 1** **Sept – Oct**	**Nutrition and Digestion** Food Groups Balanced Diet Digestion of Food Enzymes How Glucose is Used in **Microbes and disease** Types of micro-organisms Spread of Diseases Methods of Preventing Diseases White Blood Cells	**Pupils will learn:** • The foods needed for a balanced diet • How food is digested by enzymes • How glucose is needed to produce energy **Pupils will learn:** • That micro-organisms can be useful as well as cause disease • The body has its own natural defense	**End of topic test**
Autumn Term 2 **Oct - Dec**	**Atoms and the Periodic Table** Elements, Classification of Elements, Metals, Non-metals Making Compounds and Mixtures Word Equations	**Pupils will learn:** • To identify metals and non-metals • To define what an element is • The difference between mixtures and compounds • Word equations • How mass is conserved in chemical reactions	**End of topic test**
Spring **Term 1** **Jan - Feb**	**Magnetism** Magnetic poles Magnetic field Electromagnetic field	**Pupils will learn:** • How magnets work and produce a magnetic field • How a compass works • How an electromagnet works	**End of topic test**
Spring **Term 2** **Feb - Apr**	**Plants, reproduction and Photosynthesis** Parts of a plant Photosynthesis Plant growth Controlling growth **Cellular Respiration** Respiration Blood Circulation Lungs – Inhaled and Exhaled Air Keeping fit	**Pupils will learn:** • The parts of a plant • The factors required for photosynthesis to occur • What is required for plant growth **Pupils will learn:** • How lungs and circulatory system are needed for respiration to occur • Smoking and drugs effect respiration	- **End of topic test**

Summer **Term 1** **Apr - May**	**Fuels and Energy** Carbon cycle Fossil fuels Energy types **Materials** Chemical changes Properties of metals Reactivity Extraction of metals	**Pupils will learn:** • To identify different energy sources • Recall the carbon cycle **Pupils will learn:** • To observe and describe chemical reactions as rearrangements of atoms • To justify uses of materials for specific functions • How chemistry is used to extract metals	**End of topic test**
Summer **Term 2** **May - Jul**	**Waves** Sound as Energy Pitch, Loudness, How Sound Travels The Ear and Hearing Light as Energy How Light Travels Reflection, Refraction, Dispersion of White Light **Space** Mass and weight Stars and galaxies Star formation	**Pupils will learn:** • How sound and light travel as different types of waves • The characteristics of light and sound waves • To explain how sound is detected by the ear **Pupils will learn:** • The differences between mass and weight and how weight is affected by gravity • How stars are formed	**End of topic test**

Year 9	UNIT TITLES	Learning Objectives	Assessment
Science **2019** **Autumn Term 1** **Sept – Oct**	**Cell Biology** Cell structure Cell division Transport in cells	**Pupils will learn:** • Cells are the basic unit of all forms of life. • Differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. • For an organism to grow, cells must divide by mitosis producing two new identical cells. • If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. This phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells.	**End of Unit Test** **Practical activity: use a light microscope to observe, draw and label a selection of plant and animal cells.** **Practical activity: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue**
Autumn Term 2 **Oct - Dec**	**Atomic Structure and the Periodic Table** A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes The periodic table	**Pupils will learn:** • The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. • The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. • The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.	**End of Unit Test**
Spring **Term 1** **Jan - Feb**	**Energy** Energy changes in a system, and the ways energy is stored before and after such changes Conservation and dissipation of energy National and global energy resources	**Pupils will learn:** • The concept of energy emerged in the 19th century. • The idea was used to explain the work output of steam engines and then generalised to understand other heat engines. It also became a key tool for understanding chemical reactions and biological systems.	**End of Unit Test** **Practical activity: an investigation to determine the specific heat capacity of one or more materials.**

		• Limits to the use of fossil fuels and global warming are critical problems for this century. • Physicists and engineers are working hard to identify ways to reduce our energy usage.	
Spring **Term 2** **Feb - Apr**	**Organisation** Principles of organisation Animal tissues, organs and organ systems Plant tissues, organs and organ systems	**Pupils will learn:** • The human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. • Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. • How the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.	**End of Unit Test** **Practical activity: use qualitative reagents to test for a range of carbohydrates, lipids and proteins** **Practical activity: investigate the effect of pH on the rate of reaction of amylase enzyme**
Summer **Term 1** **Apr - May**	**Chemical Analysis** Purity, formulations and chromatography Identification of common gases	**Pupils will learn:** • Analysts have developed a range of qualitative tests to detect specific chemicals. • The tests are based on reactions that produce a gas with distinctive properties, or a colour change or an insoluble solid that appears as a precipitate. • Instrumental methods provide fast, sensitive and accurate means of analysing chemicals, and are particularly useful when the amount of chemical being analysed is small. • Forensic scientists and drug control scientists rely on such instrumental methods in their work.	**Practical activity: investigate how paper chromatography can be used to separate and tell the difference between coloured substances**

Summer **Term 2** **May - Jul**	**Particles Model of Matter** Changes of state and the particle model Internal energy and energy transfers Particle model and pressure	**Pupils will learn:** • The particle model is widely used to predict the behaviour of solids, liquids and gases and this has many applications in everyday life. • It helps us to explain a wide range of observations and engineers use these principles when designing vessels to withstand high pressures and temperatures, such as submarines and spacecraft.	**End of Unit Test** **Practical activity: use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids**

Year 10	UNIT TITLES	Learning Objectives	Assessment

Science **2019** **Autumn Term 1** **Sept – Oct**	**Infection and Response** Communicable diseases	**Pupils will learn:** • Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. • Explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. • Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. • Many groups of bacteria have now become resistant to these antibiotics. The race is now on to develop a new set of antibiotics.	End of Unit Test
	Bonding, Structure and the Properties of Matter Chemical bonds, ionic, covalent and metallic How bonding and structure are related to the properties of substances Structure and bonding of carbon	**Pupils will learn:** • Chemists use theories of structure and bonding to explain the physical and chemical properties of materials. • Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. • Theories of bonding explain how atoms are held together in these structures. Scientists use this knowledge of structure and bonding to engineer new materials with desirable properties. The properties of these materials may offer new applications in a range of different technologies.	End of Unit Test

Autumn Term 2 **Oct - Dec**	**Bioenergetics** Photosynthesis Respiration	**Pupils will learn:** • How plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. • Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. • During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue	End of Unit Test Required practical activity: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.
	Quantitative Chemistry Chemical measurements, conservation of mass and the quantitative interpretation of chemical equations Use of amount of substance in relation to masses of pure substances	**Pupils will learn:** • Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. • Chemical reactions can be classified in various ways. Identifying different types of chemical reaction allows chemists to make sense of how different chemicals react together, to establish patterns and to make predictions about the behaviour of other chemicals. • Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas..	End of Unit Test

Spring **Term 1** **Jan - Feb**	**Homeostasis and Response** Homeostasis Hormonal coordination in humans	**Pupils will learn:** • Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about change. • The structure and function of the nervous system and how it can bring about fast responses and hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. • An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility	End of Unit Test Required practical activity: plan and carry out an investigation into the effect of a factor on human reaction time. (biology only) investigate the effect of light or gravity on the growth of newly germinated seedlings.
	Chemical Changes Reactivity of metals Reactions of acids Electrolysis	**Pupils will learn:** • How different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists to understand the complex reactions that take place in living organisms. • The extraction of important resources from the Earth makes use of the way that some elements and compounds react with each other and how easily they can be ‘pulled apart’.	Required practical activity: preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. Required practical activity: investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis (chemistry only) determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration.

Spring **Term 2** **Feb - Apr**	**Energy Changes** Exothermic and endothermic reactions	**Pupils will learn:** • Energy changes are an important part of chemical reactions. • The interaction of particles often involves transfers of energy due to the breaking and formation of bonds. • Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. These interactions between particles can produce heating or cooling effects that are used in a range of everyday applications. Some interactions between ions in an electrolyte result in the production of electricity. • Cells and batteries use these chemical reactions to provide electricity. Electricity can also be used to decompose ionic substances and is a useful means of producing elements that are too expensive to extract any other way.	End of Unit Test Required practical activity: investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals.
	Atomic Structure Atoms and isotopes Atoms and nuclear radiation	**Pupils will learn:** • Ionising radiation is hazardous but can be very useful. • Although radioactivity was discovered over a century ago, it took many nuclear physicists several decades to understand the structure of atoms, nuclear forces and stability. • Early researchers suffered from their exposure to ionising radiation. Rules for radiological protection were first introduced in the 1930s and subsequently improved. • Today radioactive materials are widely used in medicine, industry, agriculture and electrical power generation.	End of Unit Test

Summer **Term 1** **Apr - May**	**The Rate and Extent of Chemical Change** Rate of reaction Reversible reactions and dynamic equilibrium	**Pupils will learn:** • Chemical reactions can occur at vastly different rates. Whilst the reactivity of chemicals is a significant factor in how fast chemical reactions proceed, there are many variables that can be manipulated in order to speed them up or slow them down. • Chemical reactions may also be reversible and therefore the effect of different variables needs to be established in order to identify how to maximise the yield of desired product. Understanding energy changes that accompany chemical • reactions is important for this process. In industry, chemists and chemical engineers determine the effect of different variables on reaction rate and yield of product. Whilst there may be compromises to be made, they carry out optimisation processes to ensure that enough product is produced within a sufficient time, and in an energy-efficient way	End of Unit Test Required practical activity: investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity.
Summer **Term 2** **May - Jul**	**Waves** Waves in air, fluids and solids Electromagnetic waves	**Pupils will learn:** • Wave behaviour is common in both natural and man-made systems. • Waves carry energy from one place to another and can also carry information. • Designing comfortable and safe structures such as bridges, houses and music performance halls requires an understanding of mechanical waves. • Modern technologies such as imaging and communication systems show how we can make the most of electromagnetic waves.	End of Unit Test Required practical activity: make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. Required practical activity: investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface. (physics only): investigate the reflection of light by different types of surface and the refraction of light.