Pope Francis
Catholic Multi Academy Trust

(SCHOOL LOGO TO BE ADDED BY EACH SCHOOL)

Science Curriculum Map

Vision Statement

At The Salesian Academy of St John Bosco, our Science Department is dedicated to nurturing a holistic educational experience that reflects the Salesian values of RUAH - Respect, Understanding, Affection, and Humour. Our curriculum intent is firmly rooted in these principles to provide a well-rounded science education that shapes students into both knowledgeable and skilled scientists, as well as empathetic and responsible individuals.

We prioritize the cultivation of scientific knowledge and the understanding of essential scientific concepts, preparing all students, regardless of their background or abilities, to navigate an increasingly technological world. Throughout different key stages, we aim to foster a supportive learning environment, where students can develop vital scientific skills, including observation, experimental design, data collection, analysis, and evaluation, critical thinking, and effective communication.

We welcome diverse perspectives and encourage collaboration among students to create a supportive and engaging scientific community. Our commitment to respect and understanding extends to accommodating the individual needs of all learners, making science education accessible and engaging for every student. We believe that a supportive and diverse learning environment enriches the educational experience and prepares students for a future where science knows no boundaries.

Year 7 Curriculum INTENT

Year 7 Curriculum Map – Autumn			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
The particle Model In this unit pupils will learn: ● different properties of solids, liquids and gases ● concepts of hypotheses and theories in the context of scientific methods ● the particle theory of matter ● Brownian motion, and how its explanation using particle theory ● the particle theory to explain diffusion ● explanations and applications of gas pressure	8	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: ● compare and group materials together, according to whether they are solids, liquids or gases ● understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution (Year 5) ● use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating	● the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure (Chemistry) ● similarities and differences, including density differences, between solids, liquids and gases (Physics) ● Brownian motion in gases (Physics) ● differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transition. (Physics)

Cells, Tissues, organs and systems In this unit pupils will learn: ● reminder of what an organ ● plant and animal organs ● introduces the idea of tissues ● practical skills, which covers using a microscope ● introduces the idea of cells and ● the differences between plant and animal cells. ● organ systems	8	This unit fits into Big Idea 7: Organisms are organised on a cellular basis. From previous units, most students will have learned: ● identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers ● describe the simple functions of the basic parts of the digestive system in humans ● describe the life cycles common to a variety of animals, including humans (birth, growth, development, reproduction and death), and to a variety of plants (growth, reproduction and death) ● identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood (including the pulse and clotting) ● describe the life process of reproduction in some plants and animals ● use results from experiments as evidence	● cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope ● the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts ● The similarities and differences between plant and animal cells ● the hierarchical organisation of multicellular ● organisms: from cells to tissues to organs to systems to organisms.
Forces In this unit pupils will learn: ● that forces are pushes or pulls and that forces can change the speed or direction of movement of something or change its shape ● springs and how the extension of a spring depends on the force applied ● friction, the effects of friction and lubrication. ● pressure is a measure of the force on a given area,	8	This unit fits into Big Ideas 2 and 3 Objects can affect other objects at a distance. Changing the movement of an object requires a net force to be acting on it.: From previous units, most students will have learned: ● describe different kinds of forces, including magnetism, gravity, upthrust and friction, and be able to classify these as contact or non-contact forces ● identify the effect of drag forces that act between moving surfaces ● describe why moving objects that are not driven	● forces as pushes or pulls, arising from the interaction between two objects ● using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces ● forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between

● the effects of balanced and unbalanced forces on moving and stationary objects.		● tend to slow down.	surfaces, with pushing things out of the way; resistance to motion of air and water ● forces measured in newtons, measurements of stretch or compression as force is changed ● force–extension linear relation; Hooke's Law as a special case ● pressure measured by ratio of force over area – acting normal to any surface ● opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion ● change depending on direction of force and its size.
Reproduction In this unit pupils will learn:	8	This unit fits into Big Idea 9: Genetic information is passed down from one generation of organisms to another. From previous units, most students will have learned:	● reproduction in humans (as an example of a mammal), including the structure and function of the male and female

• an introduction to sexual reproduction in animals (including the concept of gametes and fertilisation). • the basic parts of the human male and female reproductive systems. The adaptations of gametes • how sexual intercourse leads to the formation of an embryo, its subsequent implantation in the uterus lining and the start of its further development • covers the gestation period and birth. • how a baby grows into a child and how a child then becomes sexually mature through puberty		• describe the life process of reproduction in some plants and animals • describe the changes as humans develop to old age • understand the concept of the cell • recall that some cells are specialised	reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.

Year 7 Curriculum Map – Spring			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Atoms, elements and molecules In this unit pupils will learn: • chemical and physical change and introduces basic definitions of atoms, molecules, element, compounds and mixtures • investigates elements and provides some examples with their symbols • uses the properties of elements to classify them into metals and non-metals • the formation of compounds from elements and the difference in properties between elements and compounds	8	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: • compare and group materials together, according to whether they are solids, liquids or gases (Year 4) • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) (Year 4) • demonstrate that dissolving, mixing and changes of state are reversible changes (Year 5) • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity	• the concept of a pure substance • mixtures, including dissolving • differences between atoms, elements and compounds • chemical symbols and formulae for elements and compounds • combustion, thermal decomposition, oxidation and displacement reactions

● chemical reactions and applies them to thermal decomposition reactions. ● It also extends ideas about naming compounds and further develops the idea of word equations		(electrical and thermal), and response to magnets (Year 5) ● explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda (Year 5). ● recognise differences between solids, liquids and gases, in terms of ease of flow and maintenance of shape and volume (7G) ● describe the properties of the different states of matter in terms of particle kinetics, including gas pressure and diffusion (7G).	● the varying physical and chemical properties of different elements ● the composition of the Earth ● the difference between chemical and physical changes (physics) ● atoms and molecules as particles (physics).
* SP muscles and bones* In this unit pupils will learn: ● what 'fitness' is, together with a reminder of organs and organ systems. ● the circulatory system, which includes a look at the contents and function of blood ● bones and their various functions, including the role of joints ● joints, and considers how and why they are moved by antagonistic pairs of muscles. ● how different drugs can affect the activity of muscles and the nervous system, ●	8	This unit fits into Big Idea : From previous units, most students will have learned: ● identify that humans and some other animals have skeletons and muscles for support, protection and movement (Year 3) ● identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood (Year 6) ● describe the relationship between cells, tissues, organs and organ systems (7A) ● recall the organs in and functions of the main human organ systems (7A) ● recall that some cells are adapted to their functions (7A, ● recall respiration as a life process (7A).	● the structure and functions of the gas exchange system in humans, including adaptations to function ● the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume ● the structure and functions of the human skeleton, to include support, protection, movement and making blood cells ● biomechanics – the interaction between skeleton and muscles,

			including the measurement of force exerted by different muscles ● the function of muscles and examples of antagonistic muscles ● the impact of exercise, asthma and smoking on the human gas exchange system ● the effects of recreational drugs (including substance misuse) on behaviour, health and life processes
Energy In this unit pupils will learn: ● food as the source of energy for our bodies. ● energy can be stored and transferred in different ways and that energy cannot be created or destroyed. ● fuels, including formation of fossil fuels and the use of biofuels ● looks at various renewable energy resources ● the issues resulting from our use of energy, including a brief summary of the advantages and disadvantages of different energy resources.	8	This unit fits into Big Idea 4: The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen. From previous units, most students will have learned: ● recall that temperature is a measure of how hot or cold something is and be able to use thermometers to measure temperature ● be able to describe some materials as thermal conductors and some as thermal insulators ● have seen materials burning and understand that burning is an irreversible change ● recall that plants need sunlight to grow and that animals, including humans, need food.	● comparing energy values of different foods (from labels) (kJ) ● comparing amounts of energy transferred (J, kJ, kW hour) ● fuels and energy resources ● other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels ● energy as a quantity that can be quantified and

			calculated; the total energy has
Plants and their reproduction In this unit pupils will learn: ● ways in which humans use plants other than for food. ● plant classification and biodiversity. ● different types of reproduction in plants (asexual and sexual). ● pollination in flowering plants ● fertilisation and the production of seeds, f ● the use of fruits in the dispersal of seeds. ● germination and growth, ● the complete life cycle of a flowering plant.	8	This unit fits into Big Idea 9: Genetic information is passed down from one generation of organisms to another. From previous units, most students will have learned: ● describe the life process of reproduction in some plants and animals (Year 5). ● plant cells, tissues, organs and organ systems (7A) ● photosynthesis (7A) ● sexual reproduction in humans (7B) ● respiration (7C) ● inherited variation (7D) ● interdependence (7D) ● food as a store of energy (7I).	● plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots reproduction in plants, including flower structure, ● wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms ● the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops ● the importance of plant reproduction through insect pollination in human food security ● heredity as the process by which genetic information is transmitted from one generation to the next ● differences between species

			• the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation • the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.

Year 7 Curriculum Map – Summer			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Acids and alkalis In this topic pupils will learn: • the reasons why dangerous chemicals are kept in the home. • the hazards of acids and alkalis, and how the hazard can be reduced by dilution. • The meanings of some standard hazard symbols are introduced, • use of indicators to determine whether a liquid is an acid, an alkali or neutral. • the pH scale as a way of describing how acid or alkaline a substance is and the use of universal indicator to measure pH	8	This unit fits into Big Idea : From previous units, most students will have learned: • recall some examples of reversible and irreversible changes (Year 5) • recall what happens when acids are mixed with bicarbonate of soda (Year 5). •	• chemical reactions as the rearrangement of atoms • representing chemical reactions using formulae and using equations • defining acids and alkalis in terms of neutralisation reactions • the pH scale for measuring acidity/alkalinity; and indicators • reactions of acids with alkalis to produce a salt plus water.

● the idea of neutralisation and shows how word equations can be used to model chemical reactions. ● term 'base' and explains some practical uses of neutralisation reactions.			
Current and electricity In this unit pupils will learn that: ● how the idea of current electricity was developed. ● the representation of circuits using standard symbols ● the effects of adding bulbs to series circuits ● the use of models in science. ● the differences between series and parallel circuits and how current behaves in the different types of circuit ● voltmeters and the idea that voltage is the push making current flow. ● Resistance is introduced ● mains as a form of parallel circuit as well as the use of fuses and other aspects of electrical safety. ●	8	This unit fits into Big Idea : From previous units, most students will have learned: ● be able to construct simple circuits and use them to find out whether materials are conductors or insulators ● know how switches work ● draw circuit diagrams and construct circuits from diagrams using conventional symbols ● be able to investigate the effect of changing components in a circuit on the brightness of bulbs ● describe the effects of changing the voltage of a battery ● describe the effects of short circuits and the use of fuses.	● electric current, measured in amperes, in circuits, series and parallel circuits and the domestic ring main ● current as flow of charge ● potential difference, measured in volts, battery ratings; resistance as the ratio of potential difference (p.d.) to current measured in ohms ● differences in resistance between conducting and insulating components. ●
Ecosystems In this unit pupils will learn: ● the reasons why humans explore our planet. ● the concept of a habitat	8	This unit fits into Big Idea 9: Genetic information is passed down from one generation of organisms to another.: From previous units, most students will have learned:	● the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops

● about adaptations of organisms to their environments. ● how changes in the environment affect the organisms living in a habitat ● the resources needed by organisms from their habitats and how organisms affect their habitats. ● the flow of energy through food chains, food webs and pyramids of numbers. ●		● identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other ● construct and interpret a variety of food chains, identifying producers, predators and prey (Year 4) ● describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals (Year 6). ● recall that plants need light to make food by photosynthesis (7A) ● describe how organisms need a male and a female for sexual reproduction (7B) ● describe how energy is released from food by respiration, which usually needs oxygen from the air and releases carbon dioxide as a waste gas	● how organisms affect, and are affected by, their environment, including the accumulation of toxic materials ● differences between species ● the variation between individuals within a species being continuous or discontinuous, to include ● measurement and graphical representation of variation ● the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection ● the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.
Sound In this unit pupils will learn: ● some of the ways in which animals use or make sounds	8	This unit fits into Big Idea : From previous units, most students will have learned: ● be able to name a variety of sound sources ● recall that sounds get fainter with distance	● waves on water as undulations which travel through water with transverse motion; these waves can be reflected,

● sounds being passed on by vibrations and looks at the speed of sound in different materials. ● how ears and microphones detect sound and looks at the hearing ranges of some different animals ● looks at some uses of sound, including echolocation and sonar ● compares sound waves with waves on the surface of water and introduces the idea of superposition		● explain that sounds are made by vibrations ● link the size of an object with the pitch of the sound it produces ● link the volume of a sound with the size of the vibrations producing it. ● animals need to attract mates (7A, 7D) ● ultrasound scans are used to make images of a developing foetus (7B) ● some animals are only active at night and have adaptations for this (7D).	and add or cancel – superposition ● frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound ● sound needs a medium to travel, the speed of sound in air, in water, in solids ● sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal ● auditory range of humans and animals ● pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound; waves transferring information for conversion to electrical signals by microphone. ●

Year 8 Curriculum INTENT

Year 8 Curriculum Map – Autumn			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
8A Food and Nutrition In this unit pupils will learn: ● The different types of nutrients found in food. ● The uses for different nutrients. ● Balanced diets and malnutrition ● The organs of the digestive system and their function. ● How digested food is absorbed by the small intestine.	8 Lessons	This unit fits into Big Idea 8: Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms. From KS2 most students will be able to: ● recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. From previous units, most students will be able to: ● recall the main parts of the digestive system. ● describe how some cells are adapted to the functions. ● describe how soluble substances are carried by the blood. ● describe how animals depend on other animals and plants for food. ● describe what happens during diffusion, in terms of particles. ● compare energy values of different foods using labels, including interpreting nutrition information labels.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed ● calculations of energy requirements in a healthy daily diet ● the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts) ● the role of diffusion in the movement of materials in and between cells.

8E Combustion In this unit pupils will learn: ● The combustion reactions of hydrogen and of hydrocarbons, and the products formed. ● About the oxidation of non-metals and of metals. This is developed to introduce the law of conservation of mass during reactions, using oxidation as the example. ● About fire safety by interpreting the fire triangle and the importance of using the correct type of fire extinguisher for a particular type of fire. ● About incomplete combustion of fossil fuels and the impact of this on air pollution. ● About the role of carbon dioxide in the air in the development of the greenhouse effect and how the release of greater amounts of the gas from fossil fuel combustion is thought to be linked to global warming and climate change.	8 Lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will: ● be able to define the term fuel. ● name the three states of matter and describe their properties. ● describe features of chemical reactions. ● be able to carry out the test for carbon dioxide.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure ● differences between atoms, elements and compounds ● chemical symbols and formulae for elements and compounds ● conservation of mass changes of state and chemical reactions ● chemical reactions as the rearrangement of atoms ● representing chemical reactions using formulae and using equations ● combustion, thermal decomposition, oxidation and displacement reactions ● what catalysts do ● exothermic and endothermic chemical reactions (qualitative) ● the carbon cycle ● the composition of the atmosphere

			● the production of carbon dioxide by human activity and the impact on climate.
8I Fluids In this unit pupils will learn: ● Why materials expand or contract with temperature changes. ● To explain why the temperature of a substance remains constant during a state change. ● The causes of pressure in fluids, and why pressure changes with depth (for water) or height (for air). ● About upthrust, floating and sinking. ● About drag, its causes and how it can be increased or reduced.	8 Lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles and Big Idea 3: Changing the movement of an object requires a net force to be acting on it. From KS2 most students will be able to: ● classify substances as solids, liquids or gases ● observe and name changes of state ● identify the effects of air resistance and water resistance. From previous units, most students may be able to: ● use the particle model to explain the properties of solids, liquids and gases. ● understand how particles in a gas cause pressure. ● identify differences between chemical and physical changes. ● describe the effects of balanced and unbalanced forces on objects.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water ● 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 ● conservation of material and of mass, and reversibility, in melting,

			freezing, evaporation, sublimation, condensation, dissolving ● similarities and differences, including density differences, between solids, liquids and gases ● the difference between chemical and physical changes ● the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transition. ● atoms and molecules as particles ● changes with temperature in motion and spacing of particles.
8G Metals and their Uses In this unit pupils will learn: ● The physical properties of metals and non-metals. Ideas about chemical properties and equations are considered through simple reactions of metals and non-metals. ● About corrosion as an oxidation	8 Lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From KS2 most students will be able to: ● compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets (Year 5)	This unit covers the following statements from the UK National Curriculum for Science (2013): ● chemical symbols and formulae for elements and compounds ● the concept of a pure substance

reaction of metals with oxygen, including the rusting of iron, and uses symbol and word equations to represent chemical change. ● About the different reactions of a range of metals with water and how the products of the reactions can be identified. The idea of the reactivity series is introduced. ● About the reactions of metals with dilute acids. ● About alloys and how their properties are different from the pure metals.		● explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda (Year 5). From previous units most students will be able to: ● describe the difference between chemical and physical changes. ● use the particle model to explain other observations about matter. ● describe elements, mixtures and compounds using words and particle diagrams. ● use chemical symbols for common elements. ● describe and identify metals and non-metals by their properties. ● describe the changes you might see when compounds are formed. ● name simple compounds and use word equations to describe chemical reactions.	● mixtures, including dissolving ● the identification of pure substances ● representing chemical reactions using formulae and using equations ● combustion, thermal decomposition, oxidation and displacement reactions ● reactions of acids with metals to produce a salt plus hydrogen ● the varying physical and chemical properties of different elements ● the properties of metals and non-metals ● the order of metals and carbon in the reactivity series.

Year 8 Curriculum Map – Spring			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
8C Breathing and Respiration In this unit pupils will learn: ● Why humans need air and how the discoveries of Boyle, Mayow, Priestley and Lavoisier. ● About the human gas exchange system, including how breathing	8 Lessons	This unit fits into Big Idea 8: Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms. From Year 7, most students should be able to: ● recall how cells, tissues, organs and organ systems are related.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● the role of diffusion in the movement of materials in and between cells

occurs and the importance of surface area in gas exchange. ● About the role of blood in transporting oxygen to tissues and how a lack of oxygen can affect cells. ● About anaerobic respiration, including the concept of EPOC (oxygen debt).		● describe how some cells are adapted for certain functions. ● describe diffusion. ● explain the concept of air pressure.	● the structure and functions of the gas exchange system in humans, including adaptations to function ● the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume ● the impact of exercise, asthma and smoking on the human gas exchange system ● the role of leaf stomata in gas exchange in plants ● aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life ● a word summary for aerobic respiration ● the process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration

			● the differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.
Rock Cycle In this unit pupils will learn:	8	This unit fits into Big Idea : From KS2 pupils will be able to	
8J Light In this unit pupils will learn: ● About how light travels and how we see things that are not light sources. ● About the reflection of light and conventions in ray diagrams. ● About the refraction of light and links this to the properties of lenses. ● How cameras and eyes work, and encourages students to compare the two. ● About the dispersion of light to give a spectrum and explains why coloured objects appear coloured and why their appearance can change when viewed in coloured light.	8 Lessons	This unit fits into Big Idea 4: The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen. From KS2 most students will: ● understand that light travels in straight lines and use this idea to explain how objects are seen (Year 6) • explain why shadows have the same shape as the objects that cast them, and predict the size of shadows when the position of the light source changes (Year 6). From previous units, most students may be able to: ● recall that energy is transferred by waves (7L) ● describe different kinds of wave (7L) ● recall that waves travel at different speeds in different materials (7L).	This unit covers the following statements from the UK National Curriculum for Science (2013): ● the similarities and differences between light waves and waves in matter ● light waves travelling through a vacuum; speed of light ● the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface ● use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing

			(qualitative); the human eye ● light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras ● colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.
9E Making Materials In this unit pupils will learn: ● Examples of common ceramics like china, porcelain and glass, explains how their general properties make them useful. ● Examples of polymers and explains how their common properties make them useful. ● Examples of common composite materials, such as concrete, paper and glass-reinforced plastic, and explains how the properties of a composite can be more useful than its separate materials. ● About the problems associated with the manufacture and use of certain materials. The problems discussed	8 Lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous work, most students will be able to: ● use the particle model to explain observations about matter. ● explain what a landfill site is and some of the problems they cause. ● describe the difference between elements and compounds. ● describe examples of combustion and decomposition reactions. ● explain the advantages of recycling materials. ● describe how biomagnification of toxins can occur. ● model chemical reactions using word and symbol equations. ● describe the sources and effects of the greenhouse gas carbon dioxide.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● chemical symbols and formulae for elements and compounds ● the concept of a pure substance ● the identification of pure substances ● combustion, thermal decomposition, oxidation and displacement reactions ● chemical reactions as the rearrangement of atoms

include: the effect of producing soot, acidic gases and greenhouse gases by burning fossil fuels, the release of toxic substances into the environment and the detrimental effect that waste polymer materials can have on living things. ● About the advantages and disadvantages of recycling waste materials. In particular, some of the issues associated with the recycling of metals, glass, paper, polymers and concrete.		● explain how sulfur dioxide and nitrogen oxides help to cause acid rain.	● representing chemical reactions using formulae and using equations ● exothermic and endothermic chemical reactions (qualitative) ● properties of ceramics, polymers and composites (qualitative) ● the production of carbon dioxide by human activity and the impact on climate ● Earth as a source of limited resources and the efficacy of recycling.

Year 8 Curriculum Map – Summer			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
9B Plant Growth In this unit pupils will learn: ● About photosynthesis and limiting factors in plants. ● About the adaptations of plant parts: roots, stems and leaves. ● How a plant makes other substances from glucose. ● How farmers increase yields by the use of machinery, fertilisers, pesticides and crop varieties. ● How farming can cause problems for an ecosystem.	8 Lessons	This unit fits into Big Idea 8: Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms. From previous work, most students will be able to: ● describe how organisms and organism parts are adapted to their functions ● interpret food webs ● recall the processes of photosynthesis and aerobic respiration ● recall the main food groups and their uses (carbohydrates, fats, proteins).	This unit covers the following statements from the UK National Curriculum for Science (2013): ● cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope ● the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, … chloroplasts

			● the role of diffusion in the movement of materials in and between cells ● plants making carbohydrates in their leaves by photosynthesis and gaining mineral nutrients and water from the soil via their roots ● the role of leaf stomata in gas exchange in plants ● reproduction in plants, including … insect pollination, … seed and fruit formation … ● the adaptations of leaves for photosynthesis ● aerobic … respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life ● a word summary for aerobic respiration ● the interdependence of organisms in an ecosystem, including food webs and insect-pollinated crops ● the importance of plant reproduction through

			insect pollination in human food security ● how organisms affect, and are affected by, their environment, including the accumulation of toxic materials ● the importance of maintaining biodiversity …
8L Earth and Space In this unit pupils will learn: ● About the Earth, Sun and Moon. It looks at how observations are made and the Solar System models that have been used over time to explain observations. ● About the seasons and their causes. ● the magnetic fields of bar magnets and of the Earth. ● How to calculate weight from mass and gravitational field strength, and the role of gravity in space.	8 Lessons	This unit fits into Big Idea 6: The solar system is a very small part of one of millions of galaxies in the Universe. From KS2, most students will be able to: ● describe the movement of the Earth and other planets relative to the Sun (Year 5) ● describe the movement of the Moon relative to the Earth (Year 5) ● describe the Sun, Earth and Moon as approximately spherical bodies (Year 5) ● use the idea of the Earth's rotation to explain day and night (Year 5). From previous units, most students will be able to: ● describe the difference between weight and mass ● recall the direction in which gravity acts.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity ● magnetic poles, attraction and repulsion ● magnetic fields by plotting with compass, representation by field lines ● Earth's magnetism, compass and navigation ● gravity force, weight = mass × gravitational field strength (g), on Earth g = 10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and

			between Earth and Sun (qualitative only) ● our Sun as a star, other stars in our galaxy, other galaxies ● the seasons and the Earth's tilt, day length at different times of year, in different hemispheres ● the light year as a unit of astronomical distance.
9F Reactivity In this unit pupils will learn: ● About physical and chemical explosions. This is an opportunity to review previous work on physical changes and chemical reactions, and on gas pressure. ● About the reactions of metals with air, water and dilute acids. These reactions are then used to put the metals into the reactivity series. ● About the combustion of hydrocarbons and the test for oxygen. Exothermic and endothermic reactions are introduced, with ideas about reactions that need initial energy input or constant heating. ● About displacement reactions. It starts with the thermite reaction. ● About extracting metals from their ores. The method of extraction is	8 Lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will be able to: ● recall the meaning of thermal decomposition. ● recall the difference between physical changes and chemical reactions. ● describe the particle model. ● explain the cause of gas pressure. ● recall the fire triangle ● describe what happens in a combustion reaction. ● use information on the reactions of metals to place them in an order of reactivity.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure ● changes of state in terms of the particle model ● a simple (Dalton) atomic model ● chemical symbols and formulae for elements and compounds ● conservation of mass in changes of state and chemical reactions ● chemical reactions as the rearrangement of atoms

related to the position of the metal in the reactivity series and the cost of the method.			● representing chemical reactions using formulae and using equations ● combustion, thermal decomposition, oxidation and displacement reactions ● energy changes on changes of state (qualitative) ● exothermic and endothermic chemical reactions (qualitative).
9J Force Fields and Electromagnets In this unit pupils will learn: ● About magnetic and gravitational fields. ● How insulating materials can be given a charge of static electricity and introduces the idea of an electric field. ● About current in series and parallel circuits. ● About the formula relating voltage, current and resistance. ● About electromagnets and their use in relays and simple motors.	8 Lessons	This unit fits into Big Idea 2: Objects can affect other objects at a distance. From previous units, most students will be able to: ● describe how current and voltage behave in series and parallel circuits. ● recall that resistance is a measure of how difficult it is for electricity to flow through a component.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with ... changes in positions in a field, in elastic distortions and in chemical compositions ● non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity

			● electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge ● potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current ● differences in resistance between conducting and insulating components (quantitative) ● separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects ● the idea of electric field, forces acting across the space between objects not in contact ● magnetic poles, attraction and repulsion ● magnetic fields by plotting with compass, representation by field lines

			• the magnetic effect of a current, electromagnets, D.C. motors (principles only) • gravity force, weight = mass × gravitational field strength (g), on Earth g = 10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only).

Year 9 Curriculum INTENT

Year 9 Curriculum Map – Autumn			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Microscopes and Cells. In this unit you will learn:	10 Lessons	This unit fits into Big Idea 7: • Organisms are organised on a cellular basis.	This unit covers the following statements from the UK

● How developments in microscopy have allowed us to find out more about the subcellular structures found in cells. ● Subcellular structures found in animal, plant and bacterial cells. ● Specialised cells and how they are adapted to their function. ● Difference between prokaryotic and eukaryotic cells. ● About microscopic fungi and yeast in particular. ● About protoctists, including their importance in ecosystems.		From previous units, most students will have learned: ● How to use a microscope. ● Subcellular structures in plant and animal cells. ● About the differences between cells from different organisms. ● How some specialised cells are adapted to their function.	National Curriculum for Science (2013): ● cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. ● the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts. ● the similarities and differences between plant and animal cells. ● the structural adaptations of some unicellular organisms.
Conservation of energy and energy transfers in this unit you will learn: ● energy is stored & transformed ● How to represent energy transfers using diagrams. ● considers the difference between internal (thermal) energy and temperature, and looks at the factors that affect the amount of energy stored in a heated substance ● Conduction convection and radiation ● To calculate efficiency ● To reduce wasted energy	11 lessons		This unit covers the following statements from the UK National Curriculum for Science (2013): ● comparing amounts of energy transferred (J, kJ, kW hour ● fuels and energy resources. ● heating and thermal equilibrium: temperature difference between two objects leading to energy

● How energy is paid for and introduces the kilowatt-hour as a unit of energy ● Calculate Gravitational Potential Energy & Kinetic Energy ● About renewable & non-renewable energy generation.			transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators. ● energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change ● comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions.
Mixtures and Methods of Separating Substances In this topic you will learn: ● Reviews mixtures and introduces new mixtures such as suspensions and colloids	10 lessons		This unit covers the following statements from the UK National Curriculum for Science (2013): ● the properties of the different states of

● How to use information to predict the state of a substance. ● How the arrangement, movement and energy of particles change during a change in state. ● How to use melting point to tell the difference between pure and impure substances. ● How to identify substances using melting points and chromatography. ● How different methods of separation work.			matter (solid, liquid and gas) in terms of the particle model, including gas pressure. ● changes of state in terms of the particle model ● energy changes on changes of state (qualitative) ● the concept of a pure substance ● mixtures, including dissolving. ● simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography. ● the identification of pure substances
Cells and Control In this unit you will learn: ● about mitosis and its importance in growth repair and asexual reproduction. ● How cells become specialised ● The importance of stem cells. ● To identify different specialised cells in the nervous system ● How the nervous system works.	9 Lessons	From previous units, most students will have learned: ● that cells divide. ● about the structure of plant and animal cells (including chromosomes in their nuclei). ● that your nervous system helps control your actions. ● ● how two gametes fuse during fertilisation to produce a single zygote. ● how the nuclei of eukaryotic cells contain chromosomes which contain DNA.	This unit covers the following statements from the UK National Curriculum for Science (2013): ● cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope. ● the functions of the cell wall, cell membrane, cytoplasm, nucleus,

			vacuole, mitochondria and chloroplasts.

Year 9 Curriculum Map – Spring			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Motion In this topic you will learn: ● The difference between vector and scalar quantities. ● How to calculate speed and acceleration. ● How ro represent journeys on distance/time and velocity/time graphs. ● How to use graphs to calculate speed, acceleration and distance travelled.	6 lessons		This unit covers the following statements from the UK National Curriculum for Science (2013): ● speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time). ● the representation of a journey on a distance-time graph.
Atomic structure In this topic you will learn: ● How our ideas about atoms have changed ● introduces Dalton's atomic theory, the difference between elements and compounds, and the use of symbols to describe elements ● What relative atomic mass is. ● What is RAM ● [H] calculate RAM	6 Lessons		This unit covers the following statements from the UK National Curriculum for Science (2013): ● a simple (Dalton) atomic model. ● differences between atoms, elements and compounds ● chemical symbols and formulae for elements and compounds
Genetics in this topic you will learn:	11 Lessons		This unit covers the following statements from the UK

● how gametes are produced by meiosis ● about the structure of DNA ● about mutations and how genes cause genetic variation ● why certain characteristics are passed on through families. ● look at how genes can affect the survival of an individual or an entire species.			National Curriculum for Science (2013): ● 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 ● variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
The periodic table In this topic you will learn ● How Mendeleev arranged the elements around known elements ● How he predicted undiscovered elements ● How elements are arranged in the modern periodic table ● How electrons are arranged in atoms	6 Lessons		This unit covers the following statements from the UK National Curriculum for Science (2013): ● chemical symbols and formulae for elements and compounds ● the principles underpinning the

• physical properties of metals and non-metals show patterns within the modern periodic table • uses the formation and properties of oxides to show trends in both physical and chemical properties in the periodic table. • It also shows how the periodic table can be used to make predictions about the properties of elements and compounds.			Mendeleev Periodic Table. • the Periodic Table: periods and groups; metals and non-metals • how patterns in reactions can be predicted with reference to the Periodic Table.

Year 9 Curriculum Map – Summer			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Natural Selection and Evolution • About Darwin's theory of evolution by natural selection. • How genes can affect the survival of an individual or an entire species. • How different methods including genetic analysis are being used to investigate evolution. • How organisms are classified. • About selective breeding. • How genetic modification is done.			This unit covers the following statements from the UK National Curriculum for Science (2013): • the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. • changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and

			reproduce, which in turn may lead to extinction. ● the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.
			This unit covers the following statements from the UK National Curriculum for Science (2013):

Year 10 Curriculum INTENT

Year 10 Curriculum Map – Autumn			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Forces and Motion In this unit you will learn: ● about Newton's Laws of motion.	13 lessons	This unit fits into Big Idea 3: Changing the movement of an object requires a net force to be acting on it.	This unit covers the following statements from the Edexcel Combined Science Specification (2016):

● calculate the weight of an object from its mass. ● about factors that affect the stopping distance of a vehicle. ● about the dangers of large decelerations. ● [H] how to calculate momentum and apply ideas of momentum to collisions.		From previous units, most students will have learned: ● what forces are and the effects of balanced and unbalanced forces. ● how average speed, distance and time are related. ● how to represent a journey on a distance/time graph.	● 2.14 Recall Newton's first law and use it in the following situations: a where the resultant force on a body is zero, i.e. the body is moving at a constant velocity or is at rest b where the resultant force is not zero, i.e. the speed and/or direction of the body change(s) ● 2.15 Recall and use Newton's second law as: force (newton, N) = mass (kilogram, kg) × acceleration (metre per second squared, m/s2) F = m× a ● 2.16 Define weight, recall and use the equation: weight (newton, N) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) W = m× g ● 2.17 Describe how weight is measured ● 2.18 Describe the relationship between the weight of a body and the

			gravitational field strength ● 2.19 Core Practical: Investigate the relationship between force, mass and acceleration by varying the masses added to trolleys ● 2.20 Explain that an object moving in a circular orbit at constant speed has a changing velocity (qualitative only) ● 2.21 Explain that for motion in a circle there must be a resultant force known as a centripetal force that acts towards the centre of the circle ● 2.22 Explain that inertial mass is a measure of how difficult it is to change the velocity of an object (including from rest) and know that it is defined as the ratio of force over acceleration ● 2.23 Recall and apply Newton's third law both to equilibrium situations and to collision interactions and relate it to the conservation of momentum in collisions

			● 2.24 Define momentum, recall and use the equation: momentum (kilogram metre per second, kg m/s) = mass (kilogram, kg) × velocity (metre per second, m/s) p = m × v ● 2.25 Describe examples of momentum in collisions ● 2.26 Use Newton's second law as: force (newton, N) = change in momentum (kilogram metre per second, kg m/s) ÷ time (second, s) F = (mv - mu)/t ● 2.27 Explain methods of measuring human reaction times and recall typical results ● 2.28 Recall that the stopping distance of a vehicle is made up of the sum of the thinking distance and the braking distance ● 2.29 Explain that the stopping distance of a vehicle is affected by a range of factors including: a the mass of the vehicle b the speed of the vehicle c the

			driver's reaction time d the state of the vehicle's brakes e the state of the road f the amount of friction between the tyre and the road surface ● 2.30 Describe the factors affecting a driver's reaction time including drugs and distractions ● 2.31 Explain the dangers caused by large decelerations and estimate the forces involved in typical situations on a public road
Cells and Controls In this unit you will learn: ● about mitosis and its importance in growth repair and asexual reproduction. ● How cells become specialised ● The importance of stem cells. ● To identify different specialised cells in the nervous system ● How the nervous system works.	9 lessons	This unit fits into Big Idea 7: Organisms are organised on a cellular basis. From previous units, most students will have learned: ● that cells divide. ● about the structure of plant and animal cells (including chromosomes in their nuclei). ● that your nervous system helps control your actions. ● ● how two gametes fuse during fertilisation to produce a single zygote. ● how the nuclei of eukaryotic cells contain chromosomes which contain DNA.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 2.1 Describe mitosis as part of the cell cycle, including the stages interphase, prophase, metaphase, anaphase and telophase and cytokinesis ● 2.2 Describe the importance of mitosis in growth, repair and asexual reproduction ● 2.3 Describe the division of a cell by mitosis as the production of two

			daughter cells, each with identical sets of chromosomes in the nucleus to the parent cell, and that this results in the formation of two genetically identical diploid body cells ● 2.4 Describe cancer as the result of changes in cells that lead to uncontrolled cell division ● 2.5 Describe growth in organisms, including: a cell division and differentiation in animals b cell division, elongation and differentiation in plants ● 2.6 Explain the importance of cell differentiation in the development of specialised cells ● 2.7 Demonstrate an understanding of the use of percentiles charts to monitor growth ● 2.8 Describe the function of embryonic stem cells, stem cells in animals and meristems in plants ● 2.9 Discuss the potential benefits and risks

			associated with the use of stem cells in medicine ● 2.13 Explain the structure and function of sensory receptors, sensory neurones, relay neurones in the CNS, motor neurones and synapses in the transmission of electrical impulses, including the axon, dendron, myelin sheath and the role of neurotransmitters. ● 2.14 Explain the structure and function of a reflex arc including sensory, relay and motor neurones
Ionic Bonding, Covalent Bonding, Types of Substances In this unit you will learn: ● How ionic, covalent and metallic bonds are formed ● About the formation of lattices and molecular structures ● How the physical properties of a substance are linked to its bonds and structures	12 lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: ● About the particle model of matter ● How elements are arranged in the periodic table ● Chemical symbols for elements ● About periods and groups ● position of metals and non metals	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 0.1 Recall the formulae of elements, simple compounds and ions ● 1.21 Explain how ionic bonds are formed by the transfer of electrons between atoms to produce cations and anions, including the use of dot and cross diagrams

			● 1.22 Recall that an ion is an atom or group of atoms with a positive or negative charge ● 1.23 Calculate the numbers of protons, neutrons and electrons in simple ions given the atomic number and mass number ● 1.24 Explain the formation of ions in ionic compounds from their atoms, limited to compounds of elements in groups 1, 2, 6 and 7 ● 1.25 Explain the use of the endings –ide and –ate in the names of compounds ● 1.26 Deduce the formulae of ionic compounds (including oxides, hydroxides, halides, nitrates, carbonates and sulfates) given the formulae of the constituent ions ● 1.27 Explain the structure of an ionic compound as a lattice structure a consisting of a regular arrangement of ions b held together by strong electrostatic

			forces (ionic bonds) between oppositely-charged ions ● 1.28 Explain how a covalent bond is formed when a pair of electrons is shared between two atoms ● 1.29 Recall that covalent bonding results in the formation of molecules ● 1.30 Recall the typical size (order of magnitude) of atoms and small molecules ● 1.31 Explain the formation of simple molecular, covalent substances, using dot and cross diagrams, including: a hydrogen b hydrogen chloride c water d methane e oxygen f carbon dioxide ● 1.32 Explain why elements and compounds can be classified as: a ionic b simple molecular (covalent) c giant covalent d metallic and how the structure and bonding of these types of substances results in different physical

			properties, including relative melting point and boiling point, relative solubility in water and ability to conduct electricity (as solids and in solution) ● 1.33 Explain the properties of ionic compounds limited to: a high melting points and boiling points, in terms of forces between ions b whether or not they conduct electricity as solids, when molten and in aqueous solution ● 1.34 Explain the properties of typical covalent, simple molecular compounds limited to: a low melting points and boiling points, in terms of forces between molecules (intermolecular forces) b poor conduction of electricity ● 1.35 Recall that graphite and diamond are different forms of carbon and that they are examples of giant covalent substances

			• 1.36 Describe the structures of graphite and diamond • 1.37 Explain, in terms of structure and bonding, why graphite is used to make electrodes and as a lubricant, whereas diamond is used in cutting tools • 1.38 Explain the properties of fullerenes including C60 and graphene in terms of their structures and bonding • 1.39 Describe, using poly(ethene) as the example, that simple polymers consist of large molecules containing chains of carbon atoms • 1.40 Explain the properties of metals, including malleability and the ability to conduct electricity • 1.41 Describe the limitations of particular representations and models to, include dot and cross, ball and stick models and two- and three-dimensional representations

			● 1.42 Describe most metals as shiny solids which have high melting points, high density and are good conductors of electricity whereas most non-metals have low boiling points and are poor conductors of electricity
Conservation of Energy In this unit you will learn: ● energy is stored & transformed ● How to represent energy transfers using diagrams. ● considers the difference between internal (thermal) energy and temperature, and looks at the factors that affect the amount of energy stored in a heated substance ● Conduction convection and radiation ● To calculate efficiency ● To reduce wasted energy ● How energy is paid for and introduces the kilowatt-hour as a unit of energy ● Calculate Gravitational Potential Energy & Kinetic Energy ● About renewable & non-renewable energy generation.	9 lessons	This unit fits into Big Idea 4: The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen. From previous units, most students will have learned: ● That temperature differences lead to energy transfers ● That energy is conserved	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 3.1 Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: change in gravitational potential energy (joule, J) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) × change in vertical height (metre, m) ΔGPE = m× g ×Δh ● 3.2 Recall and use the equation to calculate the amounts of energy associated with a moving object: kinetic energy (joule, J) = 0.5 × mass

			(kilogram, kg) × (speed)2 1/2 KE = × m× v2 ● 3.3 Draw and interpret diagrams to represent energy transfers 1c ● 3.4 Explain what is meant by conservation of energy ● 3.5 Analyse the changes involved in the way energy is stored when a system changes, including: a an object projected upwards or up a slope b a moving object hitting an obstacle c an object being accelerated by a constant force d a vehicle slowing down e bringing water to a boil in an electric kettle ● 3.6 Explain that where there are energy transfers in a closed system there is no net change to the total energy in that system ● 3.7 Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings

			● 3.8 Explain, using examples, how in all system changes energy is dissipated so that it is stored in less useful ways ● 3.9 Explain ways of reducing unwanted energy transfer including through lubrication, thermal insulation ● 3.10 Describe the effects of the thickness and thermal conductivity of the walls of a building on its rate of cooling qualitatively ● 3.11 Recall and use the equation: efficiency = (total energy supplied to the device) / (useful energy transferred by the device efficiency) ● 3.12 Explain how efficiency can be increased ● 3.13 Describe the main energy sources available for use on Earth (including fossil fuels, nuclear fuel, bio-fuel, wind, hydro-electricity, the tides and the Sun), and compare the ways in which both renewable

			and non-renewable sources are used ● 3.14 Explain patterns and trends in the use of energy resources
Calculations Involving Masses In this unit you will learn: ● how to use relative atomic masses to calculate relative formula masses of elements and compounds. ● how to work out empirical formulae of compounds. ● how to calculate the masses of reactants or products in a reaction. ● how to calculate the concentration of a solution. ● [H] about the Avogadro constant and the quantity 1 mol of a substance. ● [H]. how to calculate the number of particles in a substance.	5 lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: ● Atoms, elements and molecules. ● how to represent elements and compounds as symbols. ● how mass is conserved during changes in state and chemical reactions. ● how to show chemical reactions as equations.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 1.43 Calculate: a relative formula mass given relative atomic masses a percentage by mass of an element in a compound given relative atomic masses ● 1.44 Calculate the formulae of simple compounds from reacting masses or percentage composition and understand that these are empirical formulae ● 1.45 Deduce: a the empirical formula of a compound from the formula of its molecule b the molecular formula of a compound from its empirical formula and its relative molecular mass ● 1.46 Describe an experiment to determine

			the empirical formula of a simple compound such as magnesium oxide ● 1.47 Explain the law of conservation of mass applied to: a a closed system including a precipitation reaction in a closed flask b a non-enclosed system including a reaction in an open flask that takes in or gives out a gas ● 1.48 Calculate masses of reactants and products from balanced equations, given the mass of one substance ● 1.49 Calculate the concentration of solutions in g dm–3 ● 1.50 Recall that one mole of particles of a substance is defined as: ● a the Avogadro constant number of particles (6.02 × 1023 atoms, molecules, formulae or ions) of that substance b a mass of 'relative particle mass' g ● 1.51 Calculate the number of: a moles of particles of a substance in a given mass of that

			substance and vice versa b particles of a substance in a given number of moles of that substance and vice versa c particles of a substance in a given mass of that substance and vice versa ● 1.52 Explain why, in a reaction, the mass of product formed is controlled by the mass of the reactant which is not in excess ● 1.53 Deduce the stoichiometry of a reaction from the masses ● of the reactants and products

Year 10 Curriculum Map – Spring			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Genetics In this unit you will learn: ● how gametes are produced by meiosis. ● about the structure of DNA. ● about mutations and how genes cause genetic variation. ● why certain characteristics are passed down through families.	10 lessons	This unit fits into Big Idea 9: Genetic information is passed down from one generation of organisms to another. From previous units, most students will have learned: ● that cells divide. ● about the structure of plant and animal cells (including chromosomes in their nuclei). ● about the differences between environmental and inherited variation.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 3.3 Explain the role of meiotic cell division, including the production of four daughter cells, each with half the number of

		● how two gametes fuse during fertilisation to produce a single zygote. ● how the nuclei of eukaryotic cells contain chromosomes which contain DNA.	chromosomes, and that this results in the formation of genetically different haploid gametes. The stages of meiosis are not required ● 3.4 Describe DNA as a polymer made up of: a two strands coiled to form a double helix b strands linked by a series of complementary base pairs joined together by weak hydrogen bonds c nucleotides that consist of a sugar and phosphate group with one of the four different bases attached to the sugar ● 3.5 Describe the genome as the entire DNA of an organism and a gene as a section of a DNA molecule that codes for a specific protein ● 3.6 Explain how DNA can be extracted from fruit ● 3.12 Explain why there are differences in the inherited characteristics as a result of alleles ● 3.13 Explain the terms: chromosome, gene, allele, dominant, recessive, homozygous,

			heterozygous, genotype, phenotype, gamete and zygote ● 3.14 Explain monohybrid inheritance using genetic diagrams, Punnett squares and family pedigrees ● 3.15 Describe how the sex of offspring is determined at fertilisation, using genetic diagrams ● 3.16 Calculate and analyse outcomes (using probabilities, ratios and percentages) from monohybrid crosses and pedigree analysis for dominant and recessive traits ● 3.19 State that most phenotypic features are the result of multiple genes rather than single gene inheritance ● 3.20 Describe the causes of variation that influence phenotype, including: a genetic variation – different characteristics as a result of mutation and sexual reproduction b environmental variation

			– different characteristics caused by an organism's environment (acquired characteristics) ● 3.21 Discuss the outcomes of the Human Genome Project and its potential applications within medicine ● 3.22 State that there is usually extensive genetic variation within a population of a species and that these arise through mutations ● 3.23 State that most genetic mutations have no effect on the phenotype, some mutations have a small effect on the phenotype and, rarely, a single mutation will significantly affect the phenotype
Acids and Alkalis In this unit you will learn: ● about ions in acids and alkali, and how their concentrations are linked to pH. ● what happens in the reactions between acids and different types of bases.	14 lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: ● how common international hazard symbols are used. ● about common acid, alkali and neutral solutions. ● about the use of indicators to test the pH of solutions.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 0.1 Recall the formulae of elements, simple compounds and ions

● how different indicators can be used in acid-alkali titrations. ● how different soluble and insoluble salts can be prepared in the laboratory. ● Core practicals: Preparing Copper Sulphate. Investigating Neutralisation.		● about what happens during simple neutralisation reactions. ● how to represent elements and compounds as symbols. ● how to show chemical reactions as equations.	● 0.2 Write word equations ● 0.3 Write balanced chemical equations, including the use of the state symbols (s), (l), (g) and (aq) ● 0.4 Write balanced ionic equations ● 3.1 Recall that acids in solution are sources of hydrogen ions and alkalis in solution are sources of hydroxide ions ● 3.2 Recall that a neutral solution has a pH of 7 and that acidic solutions have lower pH values and alkaline solutions higher pH values ● 3.3 Recall the effect of acids and alkalis on indicators, including litmus, methyl orange and phenolphthalein ● 3.4 Recall that the higher the concentration of hydrogen ions in an acidic solution, the lower the pH; and the higher the concentration of hydroxide ions in an alkaline solution, the higher the pH

			● 3.5 Recall that as hydrogen ion concentration in a solution increases by a factor of 10, the pH of the solution decreases by 1 ● 3.6 Core Practical: Investigate the change in pH on adding powdered calcium hydroxide or calcium oxide to a fixed volume of dilute hydrochloric acid ● 3.7 Explain the terms dilute and concentrated, with respect to amount of substances in solution ● 3.8 Explain the terms weak and strong acids, with respect to the degree of dissociation into ions ● 3.9 Recall that a base is any substance that reacts with an acid to form a salt and water only ● 3.10 Recall that alkalis are soluble bases ● 3.11 Explain the general reactions of aqueous solutions of acids with: a metals b metal oxides c metal hydroxides d

			metal carbonates to produce salts ● 3.12 Describe the chemical test for: a hydrogen b carbon dioxide (using limewater) ● 3.13 Describe a neutralisation reaction as a reaction between an acid and a base ● 3.14 Explain an acid-alkali neutralisation as a reaction in which hydrogen ions (H+) from the acid react with hydroxide ions (OH–) from the alkali to form water ● 3.15 Explain why, if soluble salts are prepared from an acid and an insoluble reactant: a excess of the reactant is added b the excess reactant is removed c the solution remaining is only salt and water ● 3.16 Explain why, if soluble salts are prepared from an acid and a soluble reactant: a titration must be used b the acid and the soluble reactant are then mixed

			in the correct proportions c the solution remaining, after reaction, is only salt and water ● 3.17 Core Practical: Investigate the preparation of pure, dry hydrated copper sulfate crystals starting from copper oxide including the use of a water bath ● 3.19 Recall the general rules which describe the solubility of common types of substances in water: a all common sodium, potassium and ammonium salts are soluble b all nitrates are soluble c common chlorides are soluble except those of silver and lead d common sulfates are soluble except those of lead, barium and calcium e common carbonates and hydroxides are insoluble except those of sodium, potassium and ammonium ● 3.20 Predict, using solubility rules, whether or not a precipitate will

			be formed when named solutions are mixed together, naming the precipitate if any ● 3.21 Describe the method used to prepare a pure, dry sample of an insoluble salt
Waves In this unit you will learn: ● waves transfer energy. ● to describe the characteristics of waves. ● speed of a wave is related to wavelength and frequency. ● How waves refract at different boundaries.	7 lessons	This unit fits into Big Idea 4: The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen. From previous units, most students will have learned: ● How sound and light waves can be described ● how sound waves are detected by our ear ● Some uses of sound waves ● how light can be absorbed scattered and reflected ● That light can transfer energy. ● About colours and their properties	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 4.1 Recall that waves transfer energy and information without transferring matter ● 4.2 Describe evidence that with water and sound waves it is the wave and not the water or air itself that travels ● 4.3 Define and use the terms frequency and wavelength as applied to waves ● 4.4 Use the terms amplitude, period, wave velocity and wavefront as applied to waves ● 4.5 Describe the difference between longitudinal and transverse waves by

			referring to sound, electromagnetic, seismic and water waves ● 4.6 Recall and use both the equations below for all waves: wave speed (metre/second, m/s) = frequency (hertz, Hz) × wavelength (metre, m) v = f ×λ wave speed (metre/second, m/s) = distance (metre, m) ÷ time (second, s) v = x / t ● 4.7 Describe how to measure the velocity of sound in air and ripples on water surfaces ● 4.10 Explain how waves will be refracted at a boundary in terms of the change of direction and speed ● 4.11 Recall that different substances may absorb, transmit, refract or reflect waves in ways that vary with wavelength ● 4.17 Core Practical: Investigate the suitability of equipment to measure the speed, frequency and wavelength of a wave in a solid and a fluid

Natural Selection and Genetic Modification In this unit you will learn: ● about Darwin's theory of evolution by natural selection. ● how different methods including genetic analysis are being used to investigate evolution. ● how organisms are classified. ● about selective breeding. ● how genetic modification is done.	7 lessons	This unit fits into Big Idea 9: Genetic information is passed down from one generation of organisms to another and Big Idea 10: The diversity of organisms, living and extinct, is the result of evolution. From previous units, most students will have learned: ● that organisms change over time (evolution). ● that Charles Darwin came up with a theory to explain this. ● about how DNA contains the instructions for the characteristics of organisms. ● about the use of microscopes to study cells.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 4.2 Explain Darwin's theory of evolution by natural selection ● 4.3 Explain how the emergence of resistant organisms supports Darwin's theory of evolution including antibiotic resistance in bacteria ● 4.4 Describe the evidence for human evolution, based on fossils, including: a Ardi from 4.4 million years ago b Lucy from 3.2 million years ago c Leakey's discovery of fossils from 1.6 million years ago ● 4.5 Describe the evidence for human evolution based on stone tools, including: a the development of stone tools over time b how these can be dated from their environment ● 4.7 Describe how genetic analysis has led to the

			suggestion of the three domains rather than the five kingdoms classification method ● 4.8 Explain selective breeding and its impact on food plants and domesticated animals ● 4.10 Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics ● 4.11 Describe the main stages of genetic engineering including the use of: a restriction enzymes b ligase c sticky ends d vectors ● 4.14 Evaluate the benefits and risks of genetic engineering and selective breeding in modern agriculture and medicine, including practical and ethical implications
Electrolytic Process, Obtaining and Using Metals, Reversible reactions and Equilibria In this unit you will learn: ● more about reactivity, oxidation and reduction.	10 lessons	This unit fits into Big Idea 1: All material in the Universe is made of very small particles. From previous units, most students will have learned: ● about oxidation reactions. ● about displacement reactions.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 3.22 Recall that electrolytes are ionic

● about the different ways in which metals and be extracted. ● about the advantages of recycling metals. ● about the factors involved in a life cycle assessment of a product. ● to explain what happens during electrolysis. ● about equilibria in chemical reactions. ● about the Haber process. ● [H] how to write half equations. ● Core practicals:Electrolysis of Copper sulphate solution.		● about the reactivity series. ● how elements are arranged in the periodic table. ● about anions and cations in ionic compounds. ● how to write balanced symbol equations with state symbols.	compounds in the molten state or dissolved in water ● 3.23 Describe electrolysis as a process in which electrical energy, from a direct current supply, decomposes electrolytes ● 3.24 Explain the movement of ions during electrolysis, in which: a positively charged cations migrate to the negatively charged cathode b negatively charged anions migrate to the positively charged anode ● 3.25 Explain the formation of the products in the electrolysis, using inert electrodes, of some electrolytes, including: a copper chloride solution b sodium chloride solution c sodium sulfate solution d water acidified with sulfuric acid e molten lead bromide (demonstration) ● 3.26 Predict the products of electrolysis of other binary, ionic compounds in the molten state

			● 3.27 Write half equations for reactions occurring at the anode and cathode in electrolysis ● 3.28 Explain oxidation and reduction in terms of loss or gain of electrons ● 3.29 Recall that reduction occurs at the cathode and that oxidation occurs at the anode in electrolysis reactions ● 3.30 Explain the formation of the products in the electrolysis of copper sulfate solution, using copper electrodes, and how this electrolysis can be used to purify copper ● 3.31 Core Practical: Investigate the electrolysis of copper sulfate solution with inert electrodes and copper electrodes ● 4.1 Deduce the relative reactivity of some metals, by their reactions with water, acids and salt solutions

			● 4.2 Explain displacement reactions as redox reactions, in terms of gain or loss of electrons ● 4.3 Explain the reactivity series of metals (potassium, sodium, calcium, magnesium, aluminium, (carbon), zinc, iron, (hydrogen), copper, silver, gold) in terms of the reactivity of the metals with water and dilute acids and that these reactions show the relative tendency of metal atoms to form cations ● 4.4 Recall that: a most metals are extracted from ores found in the Earth's crust b unreactive metals are found in the Earth's crust as the uncombined elements ● 4.5 Explain oxidation as the gain of oxygen and reduction as the loss of oxygen ● 4.6 Recall that the extraction of metals involves reduction of ores

			● 4.7 Explain why the method used to extract a metal from its ore is related to its position in the reactivity series and the cost of the extraction process, illustrated by a heating with carbon (including iron) b electrolysis (including aluminium) (knowledge of the blast furnace is not required) ● 4.8 Evaluate alternative biological methods of metal extraction (bacterial and phytoextraction) ● 4.9 Explain how a metal's relative resistance to oxidation is related to its position in the reactivity series ● 4.10 Evaluate the advantages of recycling metals, including economic implications and how recycling can preserve both the environment and the supply of valuable raw materials ● 4.11 Describe that a life-cycle assessment for a product involves

			consideration of the effect on the environment of obtaining the raw materials, manufacturing the product, using the product and disposing of the product when it is no longer useful ● 4.12 Evaluate data from a life cycle assessment of a product ● 4.13 Recall that chemical reactions are reversible, the use of the symbol ⇌ in equations and that the direction of some reversible reactions can be altered by changing the reaction conditions ● 4.14 Explain what is meant by dynamic equilibrium ● 4.15 Describe the formation of ammonia as a reversible reaction between nitrogen (extracted from the air) and hydrogen (obtained from natural gas) and that it can reach a dynamic equilibrium ● 4.16 Recall the conditions for the Haber process as: a

			temperature 450 °C b pressure 200 atmospheres c iron catalyst ● 4.17 Predict how the position of a dynamic equilibrium is affected by changes in: a temperature b pressure c concentration

Year 10 Curriculum Map – Summer			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Light and Electromagnetic Spectrum In this unit you will learn: ● That light is part of the EMS, with common properties ● Some uses of the EMS ● Some dangers of the EMS ● Core practicals: Waves ● Investigating Refraction.	9 lessons	This unit fits into Big Idea : From previous units, most students will have learned: ● How sound and light waves can be described ● how sound waves are detected by our ear ● Some uses of sound waves ● how light can be absorbed scattered and reflected ● That light can transfer energy. ● About colours and their properties	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 5.7 Recall that all electromagnetic waves are transverse, that they travel at the same speed in a vacuum ● 5.8 Explain, with examples, that all electromagnetic waves transfer energy from source to observer ● 5.9 Core Practical: Investigate refraction in rectangular glass blocks in terms of the interaction of

			electromagnetic waves with matter ● 5.10 Recall the main groupings of the continuous electromagnetic spectrum including (in order) radio waves, microwaves, infrared, visible (including the colours of the visible spectrum), ultraviolet, x-rays and gamma rays ● 5.11 Describe the electromagnetic spectrum as continuous from radio waves to gamma rays and that the radiations within it can be grouped in order of decreasing wavelength and increasing frequency ● 5.12 Recall that our eyes can only detect a limited range of frequencies of electromagnetic radiation ● 5.13 Recall that different substances may absorb, transmit, refract or reflect electromagnetic waves in ways that vary with wavelength ● 5.14 Explain the effects of differences in the

			velocities of electromagnetic waves in different substances ● 5.20 Recall that the potential danger associated with an electromagnetic wave increases with increasing frequency ● 5.21 Describe the harmful effects on people of excessive exposure to electromagnetic radiation, including: a microwaves: internal heating of body cells b infrared: skin burns c ultraviolet: damage to surface cells and eyes, leading to skin cancer and eye conditions d x-rays and gamma rays: mutation or damage to cells in the body ● 5.22 Describe some uses of electromagnetic radiation a radio waves: including broadcasting, communications and satellite transmissions b microwaves: including cooking, communications and satellite transmissions c

			infrared: including cooking, thermal imaging, short range communications, optical fibres, television remote controls and security systems d visible light: including vision, photography and illumination e ultraviolet: including security marking, fluorescent lamps, detecting forged bank notes and disinfecting water f x-rays: including observing the internal structure of objects, airport security scanners and medical x-rays g gamma rays: including sterilising food and medical equipment, and the detection of cancer and its treatment ● 5.23 Recall that radio waves can be produced by, or can themselves induce, oscillations in electrical circuits ● 5.24 Recall that changes in atoms and nuclei can a generate radiations over a wide frequency range b be caused by absorption of a range of radiations

Health, Disease and Development of Medicine In this unit you will learn: ● about how we define health. ● about some pathogens and the diseases they cause. ● how the spread of pathogens can be reduced or prevented. ● how the body is protected against infection. ● about the immune system. ● how antibiotics work. ● how new medicines are developed.	10 lessons	This unit fits into Big Idea : From previous units, most students will have learned: ● that imbalances in the diet can lead to obesity and deficiency diseases. ● about the structure of bacteria.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 5.1 Describe health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, as defined by the World Health Organization (WHO) ● 5.2 Describe the difference between communicable and non-communicable diseases ● 5.3 Explain why the presence of one disease can lead to a higher susceptibility to other diseases ● 5.4 Describe a pathogen as a disease-causing organism, including viruses, bacteria, fungi and protists ● 5.5 Describe some common infections, including: a cholera (bacteria) causes diarrhoea b tuberculosis (bacteria) causes lung

			damage c Chalara ash dieback (fungi) causes leaf loss and bark lesions d malaria (protists) causes damage to blood and liver e HIV (virus) destroys white blood cells, leading to the onset of AIDS ● 5.6 Explain how pathogens are spread and how this spread can be reduced or prevented, including: a cholera (bacteria) – water b tuberculosis (bacteria) – airborne c Chalara ash dieback (fungi) – airborne d malaria (protists) – animal vectors ● 5.8 Explain how sexually transmitted infections (STIs) are spread and how this spread can be reduced or prevented, including: a Chlamydia (bacteria) b HIV (virus) ● 5.12 Describe how the physical barriers and chemical defences of the human body provide protection from pathogens, including: a physical barriers,

			including mucus, cilia and skin b chemical defence, including lysozymes and hydrochloric acid ● 5.13 Explain the role of the specific immune system of the human body in defence against disease, including: a exposure to pathogen b the antigens trigger an immune response which causes the production of antibodies c the antigens also trigger production of memory lymphocytes d the role of memory lymphocytes in the secondary response to the antigen ● 5.14 Explain the body's response to immunisation using an inactive form of a pathogen ● 5.16 Explain that antibiotics can only be used to treat bacterial infections because they inhibit cell processes in the bacterium but not the host organism. ● 5.20 Describe that the process of developing

			new medicines, including antibiotics, has many stages, including discovery, development, preclinical and clinical testing. ● 5.23 Describe that many non-communicable human diseases are caused by the interaction of a number of factors, including cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition ● 5.24 Explain the effect of lifestyle factors on non-communicable diseases at local, national and global levels, including: a exercise and diet on obesity and malnutrition, including BMI and waist : hip calculations, using the BMI equation: BMI = mass (kg) / (height (m))2 b alcohol on liver diseases c smoking on cardiovascular diseases ● 5.25 Evaluate some different treatments for cardiovascular disease, including: a life-long

			medication b surgical procedures c lifestyle changes
Radioactivity In this unit you will learn: ● how the particles inside an atom are arranged. ● how to represent atoms using symbols. ● about the different types of radiation and how they affect atoms. ● about the background radiation that is all around us. ● about the dangers of radiation and how we can protect ourselves.	12 lessons	This unit fits into Big Idea : From previous units, most students will have learned: ● about the particle model of matter. ● atoms contain smaller charged particles called electrons.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● 6.1 Describe an atom as a positively charged nucleus, consisting of protons and neutrons, surrounded by negatively charged electrons, with the nuclear radius much smaller than that of the atom and with almost all of the mass in the nucleus ● 6.2 Recall the typical size (order of magnitude) of atoms and small molecules ● 6.3 Describe the structure of nuclei of isotopes using the terms atomic (proton) number and mass (nucleon) number and using symbols in the format using symbols in the format ● 6.4 Recall that the nucleus of each element

			has a characteristic positive charge, but that isotopes of an element differ in mass by having different numbers of neutrons ● 6.5 Recall the relative masses and relative electric charges of protons, neutrons, electrons and positrons ● 6.6 Recall that in an atom the number of protons equals the number of electrons and is therefore neutral ● 6.7 Recall that in each atom its electrons orbit the nucleus at different set distances from the nucleus ● 6.8 Explain that electrons change orbit when there is absorption or emission of electromagnetic radiation ● 6.9 Explain how atoms may form positive ions by losing outer electrons ● 6.10 Recall that alpha, β– (beta minus), β+ (positron), gamma rays and neutron radiation are emitted from

			unstable nuclei in a random process ● 6.11 Recall that alpha, β– (beta minus), β+ (positron) and gamma rays are ionising radiations ● 6.12 Explain what is meant by background radiation ● 6.13 Describe the origins of background radiation from Earth and space ● 6.14 Describe methods for measuring and detecting radioactivity limited to photographic film and a Geiger–Müller tube ● 6.15 Recall that an alpha particle is equivalent to a helium nucleus, a beta particle is an electron emitted from the nucleus and a gamma ray is electromagnetic radiation ● 6.16 Compare alpha, beta and gamma radiations in terms of their abilities to penetrate and ionise ● 6.17 Describe how and why the atomic model has changed over time

			including reference to the plum pudding model and Rutherford alpha particle scattering leading to the Bohr model ● 6.18 Describe the process of β– decay (a neutron becomes a proton plus an electron) ● 6.19 Describe the process of β+ decay (a proton becomes a neutron plus a positron) ● 6.20 Explain the effects on the atomic (proton) number and mass (nucleon) number of radioactive decays (α, β, γ and neutron emission) ● 6.21 Recall that nuclei that have undergone radioactive decay often undergo nuclear rearrangement with a loss of energy as gamma radiation ● 6.22 Use given data to balance nuclear equations in terms of mass and charge ● 6.23 Describe how the activity of a radioactive source decreases over a period of time

			● 6.24 Recall that the unit of activity of a radioactive isotope is the Becquerel, Bq ● 6.25 Explain that the half-life of a radioactive isotope is the time taken for half the undecayed nuclei to decay or the activity of a source to decay by half ● 6.26 Explain that it cannot be predicted when a particular nucleus will decay but half-life enables the activity of a very large number of nuclei to be predicted during the decay process ● 6.27 Use the concept of half-life to carry out simple calculations on the decay of a radioactive isotope, including graphical representations ● 6.29 Describe the dangers of ionising radiation in terms of tissue damage and possible mutations and relate this to the precautions needed

			• 6.31 Explain the precautions taken to ensure the safety of people exposed to radiation, including limiting the dose for patients and the risks to medical personnel • 6.32 Describe the differences between contamination and irradiation effects and compare the hazards associated with these two

Year 11 Curriculum INTENT

Year 11 Curriculum Map – Autumn			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
CB6 Plant Structures and their Functions In this unit pupils will learn: ● about photosynthesis and factors that affect its rate ● how rate of water uptake by a plant is affected by different factors ● how the reactants and products of photosynthesis are transported ● more about specialised cells (palisade, root hair, xylem, phloem cells)	7	This unit fits into Big Idea 8: Organisms requireasupply of energy and materials for which they are often dependent on or in competition with other organisms. From previous units, most students will have learned: ● plants make their own food using photosynthesis ● light and chlorophyll are needed for photosynthesis ● certain plant cells being specialised and adapted to their function	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Describe photosynthetic organisms as the main producers of food and therefore biomass ● Describe photosynthesis in plants and algae as an endothermic reaction that uses light energy to react carbon dioxide and water to produce glucose and oxygen ● Explain the effect of temperature, light intensity and carbon dioxide concentration as limiting factors on the rate of photosynthesis ● Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis ● Core Practical: Investigate the effect of

			light intensity on the rate of photosynthesis ● Explain how the rate of photosynthesis is directly proportional to light intensity and inversely proportional to the distance from a light source, including the use of the inverse square law calculation ● Explain how the structure of the root hair cells is adapted to absorb water and mineral ions ● Explain how the structures of the xylem and phloem are adapted to their function in the plant, including: ○ a lignified dead cells in xylem transporting water and minerals through the plant ○ b living cells in phloem using energy to transport sucrose around the plant ● Explain how water and mineral ions are transported through the

			plant by transpiration, including the structure and function of the stomata ● Describe how sucrose is transported around the plant by translocation ● Explain the effect of environmental factors on the rate of water uptake by a plant, to include light intensity, air movement and temperature ● Demonstrate an understanding of rate calculations for transpiration
CP7 - 8 Energy, Forces Doing Work, Forces and their Effects In this unit pupils will learn: • How the energy in a system can be changed • How to calculate power and work done • How objects interact with each other, through force fields and contact forces • [H] How to use vector diagrams to work out the effect of forces on an object	7	This unit fits into Big Idea 3: Changing the movement of an object requires a net force to be acting on it From previous units, most students will have learned: ● Y7: Energy the different ways in which energy can be stored and transferred. ● Y7: Forces about using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● **Describe the changes involved in the way energy is stored when systems change** ● **Draw and interpret diagrams to represent energy transfers** ● **Explain that where there are energy transfers in a closed system there is no net change to the**

			total energy in that system ● **Identify the different ways that the energy of a system can be changed a through work done by forces b in electrical equipment c in heating** ● **Describe how to measure the work done by a force and understand that energy transferred (joule, J) is equal to work done (joule, J)** ● **Recall and use the equation: work done (joule, J) = force (newton, N) × distance moved in the direction of the force (metre, m) E = F × d** ● **Describe and calculate the changes in energy involved when a system is changed by work done by forces** ● **Recall and use the equation to calculate the change in gravitational PE when an object is raised above the ground: change in gravitational potential**

			energy (joule, J) = mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg) × change in vertical height (metre, m) ΔGPE = m× g ×Δh ● **Recall and use the equation to calculate the amounts of energy associated with a moving object: kinetic energy (joule, J) = 2 1 × mass (kilogram, kg) × (speed)2 ((metre/second)2, (m/s)2) 2 2 1 KE = 0.5 × m× v2** ● **Explain, using examples, how in all system changes energy is dissipated so that it is stored in less useful ways** ● **Explain that mechanical processes become wasteful when they cause a rise in temperature so dissipating energy in heating the surroundings** ● **Define power as the rate at which energy is**

			transferred and use examples to explain this definition ● **Recall and use the equation: power (watt, W) = work done (joule, J) ÷ time taken (second, s) p= E/t** ● **Recall that one watt is equal to one joule per second, J/s** ● **Recall and use the = equation: efficiency (total energy supplied to the device) /(useful energy transferred by the device)**
CC13-15 Groups in the Periodic Table, Rates of Reaction, Heat Energy Changes in Chemical Reactions In this unit pupils will learn: ● about the properties of the elements in groups 1,7 and 0. ● how changes in conditions can affect the rates of reactions. ● about the energy transfers that occur during chemical reactions. Core practicals: ● Investigating rates of reaction.	14	This unit fits into Big Idea :. From previous units, most students will have learned: ● Y7: Elements, compounds and molecules. ● Y7: Energy about fuels and energy resources. ● Y8: The Periodic table. ● Elements compounds and the Periodic table. ● What happens during chemical reactions. ● CC3 & CC5 - the nature of atoms and ions. ● CC8 - how to write balanced symbol equations with state symbols.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Explain why some elements can be classified as alkali metals (group 1), halogens (group 7) or noble gases (group 0), based on their position in the periodic table ● Recall that alkali metals a are soft b have relatively low melting points

			● Describe the reactions of lithium, sodium and potassium with water ● Describe the pattern in reactivity of the alkali metals, lithium, sodium and potassium, with water; and use this pattern to predict the reactivity of other alkali metals ● Explain this pattern in reactivity in terms of electronic configurations ● Recall the colours and physical states of chlorine, bromine and iodine at room temperature ● Describe the pattern in the physical properties of the halogens, chlorine, bromine and iodine, and use this pattern to predict the physical properties of other halogens ● Describe the chemical test for chlorine ● Describe the reactions of the halogens, chlorine, bromine and iodine, with metals to form metal halides, and use this pattern to predict the

			reactions of other halogens ● Recall that the halogens, chlorine, bromine and iodine, form hydrogen halides which dissolve in water to form acidic solutions, and use this pattern to predict the reactions of other halogens ● Describe the relative reactivity of the halogens chlorine, bromine and iodine, as shown by their displacement reactions with halide ions in aqueous solution, and use this pattern to predict the reactions of astatine ● Explain why these displacement reactions are redox reactions in terms of gain and loss of electrons, identifying which of the substances are oxidised and which are reduced ● Explain the relative reactivity of the halogens in terms of electronic configurations ● Explain why the noble gases are chemically

			inert, compared with the other elements, in terms of their electronic configurations ● Explain how the uses of noble gases depend on their inertness, low density and/or non-flammability ● Describe the pattern in the physical properties of some noble gases and use this pattern to predict the physical properties of other noble gases ● Core Practical: Investigate the effects of changing the conditions of a reaction on the rates of chemical reactions by: a measuring the production of a gas (in the reaction between hydrochloric acid and marble chips) b observing a colour change (in the reaction between sodium thiosulfate and hydrochloric acid) ● Suggest practical methods for determining the rate of a given reaction

			● Explain how reactions occur when particles collide and that rates of reaction are increased when the frequency and/or energy of collisions is increased ● Explain the effects on rates of reaction of changes in temperature, concentration, surface area to volume ratio of a solid and pressure (on reactions involving gases) in terms of frequency and/or energy of collisions between particles ● Interpret graphs of mass, volume or concentration of reactant or product against time ● Describe a catalyst as a substance that speeds up the rate of a reaction without altering the products of the reaction, being itself unchanged chemically and in mass at the end of the reaction ● Explain how the addition of a catalyst increases the rate of a reaction in

			terms of activation energy ● Recall that enzymes are biological catalysts and that enzymes are used in the production of alcoholic drinks
CB7 Animal Coordination, Control and Homeostasis In this unit pupils will learn: ● About endocrine glands ● how hormones are transported to their target organs. ● How the menstrual cycle is controlled by hormones and how hormones are used in contraception ● About diabetes and how blood glucose levels are controlled ● [H] How hormones thyroxine and adrenaline affect the body. ● [H] What a negative feedback system is	9	This unit fits into Big Idea :. From previous units, most students will have learned: ● Y7 Reproduction ● Y8 Digestion ● How obesity is caused ● About the structure of the human reproductive system ● About the menstrual cycle ● structure of sperm and egg cells ● how enzymes digest food molecules	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Describe where hormones are produced and how they are transported from endocrine glands to their target organs, including the pituitary gland, thyroid gland, pancreas, adrenal glands, ovaries and testes ● Explain that adrenalin is produced by the adrenal glands to prepare the body for fight or flight, including: a increased heart rate b increased blood pressure c increased blood flow to the muscles d raised blood sugar levels by stimulating the liver to change glycogen into glucose

			● Explain how thyroxine controls metabolic rate as an example of negative feedback, including: a low levels of thyroxine stimulates production of TRH in hypothalamus b this causes release of TSH from the pituitary gland c TSH acts on the thyroid to produce thyroxine d when thyroxine levels are normal thyroxine inhibits the release of TRH and the production of TSH ● Describe the stages of the menstrual cycle, including the roles of the hormones oestrogen and progesterone, in the control of the menstrual cycle ● Explain the interactions of oestrogen, progesterone, FSH and LH in the control of the menstrual cycle, including the repair and maintenance of the uterus wall, ovulation and menstruation ● Explain how hormonal contraception influences

			the menstrual cycle and prevents pregnancy ● Evaluate hormonal and barrier methods of contraception ● Explain the use of hormones in Assisted Reproductive Technology (ART) including IVF and clomifene therapy ● Explain the importance of maintaining a constant internal environment in response to internal and external change ● Explain how the hormone insulin controls blood glucose concentration ● Explain how blood glucose concentration is regulated by glucagon ● Explain the cause of type 1 diabetes and how it is controlled ● Explain the cause of type 2 diabetes and how it is controlled ● Evaluate the correlation between body mass and type 2 diabetes including waist:hip calculations and BMI, using the BMI

			equation: BMI= mass (kg)/ height2
CP9 Electricity and Circuits In this unit pupils will learn: ● About current, charge and potential difference ● how to calculate resistance, power and energy transferred ● About components with changing resistance ● About UK domestic supply and electrical safety features ● Core practicals: Investigating resistance	15	This unit fits into Big Idea :. From previous units, most students will have learned: ● Y7: Electricity ○ That electric current is measured in amps and voltage is measured in volts. ○ that circuits can be connected with components in series or parallel. ○ that conductors have low resistance and insulators have high resistance	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Describe the structure of the atom, limited to the position, mass and charge of protons, neutrons and electrons ● Draw and use electric circuit diagrams representing them with the conventions of positive and negative terminals, and the symbols that represent cells, including batteries, switches, voltmeters, ammeters, resistors, variable resistors, lamps, motors, diodes, thermistors, LDRs and LEDs ● Describe the differences between series and parallel circuits ● Recall that a voltmeter is connected in parallel with a component to measure the potential difference (voltage), in volt, across it

			● Explain that potential difference (voltage) is the energy transferred per unit charge passed and hence that the volt is a joule per coulomb ● Recall and use the equation: energy transferred (joule, J) = charge moved (coulomb, C) × potential difference (volt, V) E = Q×V ● Recall that an ammeter is connected in series with a component to measure the current, in amp, in the component ● Explain that an electric current as the rate of flow of charge and the current in metals is a flow of electrons ● Recall and use the equation: charge (coulomb, C) = current (ampere, A) × time (second, s) Q = I ×t ● Describe that when a closed circuit includes a source of potential difference there will be a current in the circuit ● Recall that current is conserved at a junction in a circuit

			● Explain how changing the resistance in a circuit changes the current and how this can be achieved using a variable resistor ● Recall and use the equation: potential difference (volt, V) = current (ampere, A) × resistance (ohm, Ω) V = I × R ● Explain why, if two resistors are in series, the net resistance is increased, whereas with two in parallel the net resistance is decreased ● Calculate the currents, potential differences and resistances in series circuits ● Explain the design and construction of series circuits for testing and measuring ● Core Practical: Construct electrical circuits to: a investigate the relationship between potential difference, current and resistance for a resistor and a filament lamp b test series and parallel

			circuits using resistors and filament lamps ● Explain how current varies with potential difference for the following devices and how this relates to resistance a filament lamps b diodes c fixed resistors ● Describe how the resistance of a light-dependent resistor (LDR) varies with light intensity ● Describe how the resistance of a thermistor varies with change of temperature (negative temperature coefficient thermistors only) ● Explain how the design and use of circuits can be used to explore the variation of resistance in the following devices a filament lamps b diodes c thermistors d LDRs ● Recall that, when there is an electric current in a resistor, there is an energy transfer which heats the resistor ● Explain that electrical energy is dissipated as

			thermal energy in the surroundings when an electrical current does work against electrical resistance ● Explain the energy transfer (in 10.22 above) as the result of collisions between electrons and the ions in the lattice ● Explain ways of reducing unwanted energy transfer through low resistance wires ● Describe the advantages and disadvantages of the heating effect of an electric current ● Use the equation: energy transferred (joule, J) = current (ampere, A) × potential difference (volt, V) × time (second, s) E = I ×V ×t ● Describe power as the energy transferred per second and recall that it is measured in watt ● Recall and use the equation: power (watt, W) = energy transferred (joule, J) ÷ time taken (second, s)

			● Explain how the power transfer in any circuit device is related to the potential difference across it and the current in it ● Recall and use the equations: electrical power (watt, W) = current (ampere, A) × potential difference (volt, V), electrical power (watt, W) = current squared (ampere2, A2) × resistance (ohm, Ω) ● Describe how, in different domestic devices, energy is transferred from batteries and the a.c. mains to the energy of motors and heating devices ● Explain the difference between direct and alternating voltage ● Describe direct current (d.c.) as movement of charge in one direction only and recall that cells and batteries supply direct current (d.c.) ● Describe that in alternating current (a.c.)

			the movement of charge changes direction ● Recall that in the UK the domestic supply is a.c., at a frequency of 50 Hz and a voltage of about 230 V ● Explain the difference in function between the live and the neutral mains input wires ● Explain the function of an earth wire and of fuses or circuit breakers in ensuring safety ● Explain why switches and fuses should be connected in the live wire of a domestic circuit ● Recall the potential differences between the live, neutral and earth mains wires ● Explain the dangers of providing any connection between the live wire and earth ● Describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use

Year 11 Curriculum Map – Spring			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
CC16-17 Fuels, Earth and Atmospheric Science In this unit pupils will learn: ● about the hydrocarbons found in crude oil and natural gas. ● how crude oil is separated into useful fractions. ● about the alkanes homologous series. ● about the problems caused by some atmospheric pollutants. ● how and why the cracking of oil fractions is carried out. ● about the advantages and disadvantages of different fuels for cars. ● about how the Earth's atmosphere has changed in the past and how it is changing now. ● more about the causes and effects of climate change.	16	This unit fits into Big Idea 5: The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. From previous units, most students will have learned: ● Y7: Elements, compounds and molecules. ● Y8: The Periodic table. ○ Elements compounds and the Periodic table. ○ What happens during chemical reactions. ● Y7: Energy ○ about fuels and energy resources. ● Y7: Acids and Alkalis ○ about the acidity of non-metal oxides. ● CC1 ○ mixtures can be separated using fractional distillation. ● CC8 ○ how to write balanced symbol equations with state symbols.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Recall that hydrocarbons are compounds that contain carbon and hydrogen only ● Describe crude oil as: a a complex mixture of hydrocarbons b containing molecules in which carbon atoms are in chains or rings (names, formulae and structures of specific ring molecules not required) c an important source of useful substances (fuels and feedstock for the petrochemical industry) d a finite resource ● Describe and explain the separation of crude oil into simpler, more useful mixtures by the process of fractional distillation ● Recall the names and uses of the following fractions: a gases, used in domestic heating and

			cooking b petrol, used as fuel for cars c kerosene, used as fuel for aircraft d diesel oil, used as fuel for some cars and trains e fuel oil, used as fuel for large ships and in some power stations f bitumen, used to surface roads and roofs ● Explain how hydrocarbons in different fractions differ from each other in: a the number of carbon and hydrogen atoms their molecules contain b boiling points c ease of ignition d viscosity and are mostly members of the alkane homologous series ● Explain an homologous series as a series of compounds which: a have the same general formula b differ by CH2 in molecular formulae from neighbouring compounds c show a gradual variation in physical properties, as exemplified by their boiling points d have

			similar chemical properties ● Describe the complete combustion of hydrocarbon fuels as a reaction in which: a carbon dioxide and water are produced b energy is given out ● Explain why the incomplete combustion of hydrocarbons can produce carbon and carbon monoxide ● Explain how carbon monoxide behaves as a toxic gas ● Describe the problems caused by incomplete combustion producing carbon monoxide and soot in appliances that use carbon compounds as fuels ● Explain how impurities in some hydrocarbon fuels result in the production of sulfur dioxide ● Explain some problems associated with acid rain caused when sulfur dioxide dissolves in rain water ● Explain why, when fuels are burned in engines,

			oxygen and nitrogen can react together at high temperatures to produce oxides of nitrogen, which are pollutants ● Evaluate the advantages and disadvantages of using hydrogen, rather than petrol, as a fuel in cars ● Recall that petrol, kerosene and diesel oil are non-renewable fossil fuels obtained from crude oil and methane is a nonrenewable fossil fuel found in natural gas ● Explain why cracking involves the breaking down of larger, saturated hydrocarbon molecules (alkanes) into smaller, more useful ones, some of which are unsaturated (alkenes) ● Explain why cracking is necessary ● Recall that the gases produced by volcanic activity formed the Earth's early atmosphere ● Describe that the Earth's early atmosphere was thought to contain: a little or no oxygen b a

			large amount of carbon dioxide c water vapour d small amounts of other gases and interpret evidence relating to this ● Explain how condensation of water vapour formed oceans ● Explain how the amount of carbon dioxide in the atmosphere was decreased when carbon dioxide dissolved as the oceans formed ● Explain how the growth of primitive plants used carbon dioxide and released oxygen by photosynthesis and consequently the amount of oxygen in the atmosphere gradually increased ● Describe the chemical test for oxygen ● Describe how various gases in the atmosphere, including carbon dioxide, methane and water vapour, absorb heat radiated from the Earth, subsequently releasing energy which keeps the Earth warm: this is

			known as the greenhouse effect ● Evaluate the evidence for human activity causing climate change, considering: a the correlation between the change in atmospheric carbon dioxide concentration, the consumption of fossil fuels and temperature change b the uncertainties caused by the location where these measurements are taken and historical accuracy ● Describe: a the composition of today's atmosphere b the potential effects on the climate of increased levels of carbon dioxide and methane generated by human activity, including burning fossil fuels and livestock farming c that these effects may be mitigated: consider scale, risk and environmental implications ●

CP10 - 11 Magnetism and the Motor Effect, Electromagnetic Induction In this unit pupils will learn: ● About permanent and induced magnets and how to represent a magnetic field ● About the magnetic field around a wire and the factors that affect it ● how the field from the individual coils in a solenoid interact ● [H] How current can be induced in a wire and the factors that affect it. ● [H] How to calculate the size of the force on a wire carrying a current in a magnetic field ● [H] How to work out the direction of this force	7	This unit fits into Big Idea :. From previous units, most students will have learned: ● Y8 Force Fields ○ How to plot the shape of a magnetic field and that the earth has a magnetic field ○ That electric currents cause magnetic fields, including in electromagnets and motors	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Recall that unlike magnetic poles attract and like magnetic poles repel ● Describe the uses of permanent and temporary magnetic materials including cobalt, steel, iron and nickel ● Explain the difference between permanent and induced magnets ● Describe the shape and direction of the magnetic field around bar magnets and for a uniform field, and relate the strength of the field to the concentration of lines ● Describe the use of plotting compasses to show the shape and direction of the field of a magnet and the Earth's magnetic field ● Explain how the behaviour of a magnetic compass is related to evidence that the core of

			the Earth must be magnetic ● Describe how to show that a current can create a magnetic effect and relate the shape and direction of the magnetic field around a long straight conductor to the direction of the current ● Recall that the strength of the field depends on the size of the current and the distance from the long straight conductor ● Explain how inside a solenoid (an example of an electromagnet) the fields from individual coils a add together to form a very strong almost uniform field along the centre of the solenoid b cancel to give a weaker field outside the solenoid ● Recall that a current carrying conductor placed near a magnet experiences a force and that an equal and opposite force acts on the magnet

			● Explain that magnetic forces are due to interactions between magnetic fields ● Recall and use Fleming's left-hand rule to represent the relative directions of the force, the current and the magnetic field for cases where they are mutually perpendicular ● Use the equation: force on a conductor at right angles to a magnetic field carrying a current (newton, N) = magnetic flux density (tesla, T or newton per ampere metre, N/A m) × current (ampere, A) × length (metre, m) $F = B \times I \times l$ ● Recall the factors that affect the size and direction of an induced potential difference, and describe how the magnetic field produced opposes the original change ● Explain how an alternating current in one circuit can induce a current in another circuit in a transformer

			● Recall that a transformer can change the size of an alternating voltage ● Explain why, in the national grid, electrical energy is transferred at high voltages from power stations, and then transferred at lower voltages in each locality for domestic uses as it improves the efficiency by reducing heat loss in transmission lines ● Explain where and why step-up and step-down transformers are used in the transmission of electricity in the national grid ● Use the power equation (for transformers with100% efficiency): potential difference across primary coil (volt, V) × current in primary coil (ampere, A) = potential difference across secondary coil (volt, V) × current in secondary coil (ampere, A) P P S S V × I =V × I ●
CB8 Exchange and Transport in Animals	6	This unit fits into Big Idea :.	This unit covers the following statements from the Edexcel

In this unit pupils will learn: ● more about diffusion, gas exchange and the surface area : volume ratio. ● more about the different types of respiration. ● how the lungs, heart, blood vessels and blood are adapted for their functions. ● how to calculate cardiac output. ● Core practicals: ○ Respiration rates.		From previous units, most students will have learned: ● Y8: Food and Nutrition. ○ how digestion gets glucose and other food molecules into the blood. ● Y8: Breathing and Respiration. ○ How the respiratory system gets oxygen into the blood. ○ about aerobic and anaerobic respiration. ● CC1. ○ about diffusion. ○ about different animal cells and their adaptations.	Combined Science Specification (2016): ● Describe the need to transport substances into and out of a range of organisms, including oxygen, carbon dioxide, water, dissolved food molecules, mineral ions and urea ● Explain the need for exchange surfaces and a transport system in multicellular organisms including the calculation of surface area : volume ratio ● Explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries ● Explain how the structure of the blood is related to its function: a red blood cells (erythrocytes) b white blood cells (phagocytes and lymphocytes) c plasma d platelets ● Explain how the structure of the blood vessels is related to their function

			● Explain how the structure of the heart and circulatory system is related to its function, including the role of the major blood vessels, the valves and the relative thickness of chamber walls ● Describe cellular respiration as an exothermic reaction which occurs continuously in living cells to release energy for metabolic processes, including aerobic and anaerobic respiration ● Compare the process of aerobic respiration with the process of anaerobic respiration ● Core Practical: Investigate the rate of respiration in living organisms ● Calculate heart rate, stroke volume and cardiac output, using the equation cardiac output = stroke volume × heart rate ●
CP12 - 13 Particle Model, Forces and Matter	12	This unit fits into Big Idea 3:	This unit covers the following statements from the Edexcel

In this unit pupils will learn: ● How to explain and calculate different densities of substances ● About specific heat capacity and specific latent heat heat and how to calculate them ● How changing the temperature of a gas affects its pressure ● About Kelvin and Celsius temperature scales ● About elastic and inelastic distortion ● About the relationship between force and extension ● How to calculate the work done when stretching a spring ● Core practicals: ○ Investigating density ○ investigating SHC of water ○ investigating Springs		Changing the movement of an object requires a net force to be acting on it. From previous units, most students will have learned: ● Y7 Particles ○ That mass is conserved during a change of state ○ About the properties of solids, liquids and gases ○ How particles are arranged in a solid, liquid and a gas and how this is affected by temperature ● CP2 Forces and Motion ○ Some of the effects that forces have on objects	Combined Science Specification (2016): ● Use a simple kinetic theory model to explain the different states of matter (solids, liquids and gases) in terms of the movement and arrangement of particles ● Recall and use the equation: density (kilogram per cubic metre, kg/m3) = mass (kilogram, kg) ÷ volume (cubic metre, m3) ● Core Practical: Investigate the densities of solid and liquids ● Explain the differences in density between the different states of matter in terms of the arrangements of the atoms or molecules ● Describe that when substances melt, freeze, evaporate, boil, condense or sublimate mass is conserved and that these physical changes differ from some chemical changes because the material recovers its original

			properties if the change is reversed ● Explain how heating a system will change the energy stored within the system and raise its temperature or produce changes of state ● Define the terms specific heat capacity and specific latent heat and explain the differences between them ● Use the equation: change in thermal energy (joule, J) = mass (kilogram, kg) × specific heat capacity (joule per kilogram degree Celsius, J/kg °C) × change in temperature (degree Celsius, °C) $\Delta Q = m \times c \times \Delta\theta$ ● Use the equation: thermal energy for a change of state (joule , J) = mass (kilogram, kg) × specific latent heat (joule per kilogram, J/kg) $Q = m \times L$ ● Explain ways of reducing unwanted energy transfer through thermal insulation ● Core Practical: Investigate the

			properties of water by determining the specific heat capacity of water and obtaining a temperature-time graph for melting ice ● Explain the pressure of a gas in terms of the motion of its particles ● Explain the effect of changing the temperature of a gas on the velocity of its particles and hence on the pressure produced by a fixed mass of gas at constant volume (qualitative only) ● Describe the term absolute zero, −273 °C, in terms of the lack of movement of particles ● Convert between the kelvin and Celsius scales ● Explain, using springs and other elastic objects, that stretching, bending or compressing an object requires more than one force ● Describe the difference between elastic and inelastic distortion ● Recall and use the equation for linear

			elastic distortion including calculating the spring constant: force exerted on a spring (newton, N) = spring constant (newton per metre, N/m) × extension (metre, m) $F = k \times x$ ● Use the equation to calculate the work done in stretching a spring: energy transferred in stretching (joule, J) = 0.5 × spring constant (newton per metre, N/m) × (extension (metre, m))2 ● Describe the difference between linear and non-linear relationships between force and extension ● Core Practical: Investigate the extension and work done when applying forces to a spring ●
CB9 Ecosystems and Material Cycles In this unit pupils will learn: ● how ecosystems are organised. ● how communities are affected by abiotic and biotic factors.	12	This unit fits into Big Idea 8: Organisms requireasupply of energy and materials for which they are often dependent on or in competition with other organisms. From previous units, most students will have learned: ● Y7: Ecosystems.	This unit covers the following statements from the Edexcel Combined Science Specification (2016): ● Describe the different levels of organisation from individual

• how the abundance and distribution of organisms are measured. • about parasitism and mutualism. • how humans can affect ecosystems. • about the benefits of maintaining biodiversity. • how materials cycle through ecosystems. • about the importance of the carbon cycle, the water cycle and the nitrogen cycle Core practicals: • Quadrats and transects.		○ about the interdependence of organisms including food webs and insect pollination. ○ how organisms affect and are affected by their environments including the accumulation of toxic materials. ● Y8: Plants Growth. ○ how almost all life on Earth depends on photosynthesis in plants and algae.	organisms, populations, communities, to the whole ecosystem ● Explain how communities can be affected by abiotic and biotic factors, including: a temperature, light, water, pollutants b competition, predation ● Describe the importance of interdependence in a community ● Describe how the survival of some organisms is dependent on other species, including parasitism and mutualism ● Core Practical: Investigate the relationship between organisms and their environment using field-work techniques, including quadrats and belt transects ● Explain how to determine the number of organisms in a given area using raw data from field-work techniques, including quadrats and belt transects

			● Explain the positive and negative human interactions within ecosystems and their impacts on biodiversity, including: a fish farming b introduction of non-indigenous species c eutrophication ● Explain the benefits of maintaining local and global biodiversity, including the conservation of animal species and the impact of reforestation ● Describe how different materials cycle through the abiotic and biotic components of an ecosystem ● Explain the importance of the carbon cycle, including the processes involved and the role of microorganisms as decomposers ● Explain the importance of the water cycle, including the processes involved and the production of potable water in areas of drought including desalination

			• Explain how nitrates are made available for plant uptake, including the use of fertilisers, crop rotation and the role of bacteria in the nitrogen cycle

Year 11 Curriculum Map – Summer			
Topic details	**No. of Lessons**	**Rational/sequencing**	**N.C. coverage**
Completion of any units yet to be completed			
Reisison			