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Timeline	Topic	Key concepts and knowledge	Skills development	Rationale
Carousel – term 1	**Skills - science experiments**	During the first 6 science lessons students will build on and recap the basic experimental science skills: Knowledge: • Understand how to carry out a science experiment safely • Write up an experiment in the correct format - Apparatus, Method, Table, Graph and Conclusion • Calculate the energy released from different foods	Planning investigations. Collecting, recording, and presenting data. Analysing patterns in data.	Building on previous knowledge and skills from science experiments in previous years. Skills learned allow students to apply and develop these in practical lessons throughout more challenging future experiments and required practical's in the curriculum.

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Carousel term 1	**8e Matter 2** Periodic Table Elements	Understand that the elements in a group all react in a similar way and sometimes show a pattern in reactivity. To describe as you go down a group and across a period the elements show patterns in physical properties. Understand most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain. .	**Practice of tier 3 literacy include:** Explain Proportion Compare Conclude Estimate Formula Data Interpret Similar **Links to careers in:** Jeweller Blacksmith Analytical Chemist Miner Lab technician Hazardous waste chemist **Development of employability skills:** Numeracy Problem solving **Development of British Values** Self-help: The work of Dimitri Mendeleev shows independent achievement **Cultural Capital** Student familiarity with materials such as polymers may vary in terms of textiles, plastics and modern furnishings along with those used in modern sport equipment and vehicles	This topic builds on previous KS3 knowledge on elements and the periodic table, it begins to incorporate more challenging concepts such as compounds, chemical formulae and polymers. This prepares students for more complex tasks further up the curriculum such as bonding, structure and properties of matter, atomic structure and the periodic table.

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Carousel term 1	**7b Electromagnets 1** Voltage and resistance Currents	Understand that we can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. Describe that in a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance reduce the current flowing and shift energy to the surroundings. Describe current as a movement of electrons and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work. Understand that around a charged object, the electric field affects other charged objects, causing them to be attracted or repelled. The field strength decreases with distance.	**Practice of tier 3 literacy include:** Relationship Reason Quantity Units Conclude Range Accurate **Links to careers in:** Meteorologist Oceanographer Seismologist Electronic Engineering Medicine **Development of employability skills:** Critical Thinking Problem Solving Written Communication Communication Initiative **Development of British Values** Individual Liberty – Self Help **Cultural Capital** Communication of Science ideas and concepts Practical techniques, health and safety, development of fine motor and dexterity skills	These 2 topics have been combined as the concepts taught are very closely linked and the curriculum content lends itself to them being taught together as a combined unit allowing students to build up basic concepts before confidently incorporating them into more challenging parts of the curriculum. The first unit builds up basic concepts of current and voltage in circuits. This underpins the knowledge required for the next topic on electromagnets and magnetic fields. The progression of knowledge through this units builds a deeper understanding of the concepts required for topics further in the curriculum such as investigating resistance, electromagnetism, electromagnetic waves, permanent and induced magnets.
	8b Electromagnets 2	Understand an electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid. Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.	**Practice of tier 3 literacy include:** Relationship Reason Quantity Units Conclude Range Accurate **Links to careers in:** Meteorologist Oceanographer Seismologist Electronic Engineering	

			Medicine **Development of employability skills:** Critical Thinking Problem Solving Written Communication Communication Initiative **Development of British Values** Individual Liberty – Self Help **Cultural Capital** Communication of Science ideas and concepts Practical techniques, health and safety, development of fine motor and dexterity skills	

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Carousel term 1	**8d waves 2** Wave effects and wave properties	Understand when a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy. Demonstrate a physical model of a transverse wave - it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.	**Practice of tier 3 literacy include:** Calculate Interpret Investigate Compare Explain Data Demonstrate **Links to careers in:** Audiologist Optometrist Musician Sound technician Nursing & medicine – radiography, ultrasound **Development of employability skills:** Numeracy Self-management Problem solving Communication Team work **Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school: Self-help Self-responsibility **Cultural Capital** Use of telescopes to see light travel from distant objects Trips to observatories at Preston or Jodrell Bank Music studios – sound engineering	This topic builds on the knowledge acquired in the previous waves topic (Y7) and the matter topic (Y7 and 8) by amalgamating and applying previous knowledge about particle arrangement and waves allows students to build a greater depth of knowledge required in this topic. The skills covered during this unit allow students to confidently analyse models – a skill that is vital as the curriculum progresses. This then underpins future more challenging topics such as investigating waves, wave speed, refraction, electromagnetic waves and use of electromagnetic waves.

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Carousel – term 2	**7g Earth 1** Earth Structure and The Universe	Describe that sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling. Demonstrate that the solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Understand that our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies. Can give the name the current model of the Solar System.	**Practice of tier 3 literacy include:** Identify Explain Compare Summary Analyse **Links to careers in:** Astrophysicist Geologist Archaeologist Environmental Scientist Construction Stone mason Oil drilling Astronaut Aerospace Engineer Geography or Science Teacher **Development of employability skills:** Informed Digital skills Team Work **Development of British Values** Self-help Self-responsibility Equality Equity Solidarity **Cultural Capital** Experience a solar or lunar eclipse Trip to Malham Cove (link to Geography) Visit to a planetarium	This topic builds on previous concepts of the solar system in primary school. It introduces new knowledge such as orbits, galaxies and models of the solar system which underpin more challenging concepts covered in space physics. The skills covered during this unit allow students to confidently analyse models – a skill that is vital as the curriculum progresses. The knowledge of rocks provides valuable cross curricular links with Geography and opportunities for modelling and enrichment

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Carousel term 2	**8h Organisms 2** Breathing Digestion	Describe that in gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Understand that breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing. The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Recall the organs of the digestive system and understand they are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.	**Practice of tier 3 literacy include:** Quantity Range (e.g. there are a range of colours for a positive glucose test) Pattern Reason Relationship (e.g. the more unhealthy foods are eaten, the more chance you'll suffer ill health) Repeat (e.g. repeating food tests) Result **Links to careers in:** Radiographer Counsellor Dietician Doctor Nurse Research biologist Sports nutritionist **Development of employability skills:** Communication Numeracy Creativity Informed Self-management **Development of British Values** Rule of law Democracy Mutual respect **Cultural Capital** What experience have students had with drugs? Are there foods students haven't tried/aren't aware of? e.g. kiwi, mango, tofu… Are students aware there are many non-alcoholic alternatives? Are students aware of vegetarian and vegan diets? Students may not have heard of scurvy, rickets and other deficiency diseases. Students may not be aware of the fact smoking was previously allowed in bars, restaurants, workplaces etc.	The knowledge covered in this topic provides deeper understanding of the concepts previously covered on cells and provides opportunities to link different aspects of previous knowledge from the curriculum such as diffusion, cells, elements and compounds. It also builds knowledge to tackle more complex tasks as the curriculum progresses into the circulatory system, exchanging substances, cardiovascular disease aerobic and anaerobic respiration, the heart and digestion and enzymes. This topic provides opportunities for cross curricular links to food technology, PE and sport.

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Carousel term 3	**8i Ecosystems 2** Respiration Photosynthesis	Describe respiration as a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Understand that most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable. Describe that plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Recall that plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis.	**Practice of tier 3 literacy include:** Bar Chart Because Dependent Independent Control Variable Line Graph Pattern **Links to careers in:** (Sports) Coach Scientist Horticulturist Brewer Baker **Development of employability skills:** Problem solving. Numeracy. Team Work. Self Management **Development of British Values** Democracy. Mutual respect. **Cultural Capital** Plants releasing oxygen- how did atmosphere become created. All foods come from plants (except fungi). Yeast and brewing and baking. Waste products. Oxygen debt.	This topic allows student to amalgamate knowledge from various parts of the curriculum such as chemical reactions, elements and compounds, periodic table, digestion, diffusion, cells and organisms. The knowledge acquired allows students to tackle misconceptions in the curriculum such as confusing respiration and breathing. The concepts underpin future topics as the curriculum progresses into plant systems, photosynthesis and the rate of photosynthesis, aerobic and anaerobic respiration.

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Carousel term 3	**8a Forces 2** Contact forces Pressure	Describe that when the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. Describe that one effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied. Understand that pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust. Describe that objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces.	**Practice of tier 3 literacy include:** Calculate Data Formula Interpret **Links to careers in:** Game Developer Engineer Teacher Mechanic Architect Builder Joiner **Development of employability skills:** Problem-solving – an introduction to the calculation-based side of science. Creativity – *Creativity relies on when incorporated facts.* Informed – *adding to the pupils' overall body of knowledge* **Development of British Values** British values to be demonstrated in the over-arching culture established within the classroom and school. **Cultural Capital** Friction and drag allows for discussion of sports cars and other machines, or discussion why meteorites burn up on entry into the atmosphere. Liquid pressure lessons can discuss the difficulties of exploring the deepest oceans. Gas pressure lessons can talk about why planes can fly.	This topic deepens knowledge from the year 7 forces topic and has links to the particle model. The knowledge acquired during the unit allows students to confidently tackle more challenging parts of the curriculum such as resultant forces and work done, forces and elasticity, and investigating springs. The maths skills covered underpin those relevant to required practical's as the curriculum progresses.

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Carousel term 3	**8g Earth 2** Climate Earth resources	Understand that carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels). Describe that greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. Scientists have evidence that global warming caused by human activity is causing changes in climate. Understand that there is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources. Describe that most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals. Global warming The carbon cycle Climate change Extracting less reactive metals. Extracting more reactive metals. Recycling.	**Practice of tier 3 literacy include:** Explain Compare Analyse Proportion Identify Factor **Links to careers in:** Environmental Scientist Teacher **Development of employability skills:** Informed Digital skills Self-management Problem solving Communication **Development of British Values** Self-help Self-responsibility Equality Equity **Cultural Capital** CREST Recycling initiatives David Attenborough – Climate Change	This topic is underpinned by lots of different aspects of the science national curriculum. Knowledge acquired during multiple topics is amalgamated in the concepts covered for example photosynthesis and respiration, chemical reactions, Earth and organisms are all interwoven allowing a deeper level of understanding.