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Timeline	Topic	Key concepts and knowledge	Skills development	Rationale
Carousel – half term 1 (6 lessons)	Skills in science	During the first 6 science lessons students will acquire the basic skills they will use throughout the science curriculum: Knowledge: • Understand key scientific terms and why they are important • Practise safe working in science lessons and practical work • Identify scientific equipment, their symbols and draw scientific diagrams correctly • Understand and practice how to read scales in science • Understand and practise how to create and use a scientific table to record results • Practise transforming data/information from tables into line graphs and bar charts	Planning investigations. Collecting, recording, and presenting data. Analysing patterns in data.	These skills underpin the science curriculum and are implemented and practiced in various topics over the next 5 years

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Carousel – Term 1	**7e Matter** Particle model and separating mixtures	Knowledge - Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Melting and freezing. Boiling. Evaporation and condensation. Diffusion. Gas pressure. Elements, compounds and mixtures as particles. Progress - A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Pure substances and mixtures. Melting curve. Solutions. Solubility. How can we separate substances? Substances may be separated due to differences in their physical properties through the processes of filtration, evaporation, distillation and chromatography.	**Practice of tier 3 literacy include:** Explain Compare Conclude Data Demonstrate Estimate Interpret Method Range Similar **Links to careers in:** Doctor Cleaner Chef Criminal Investigator Forensic Scientist Mechanic **Development of employability skills:** Numeracy Team work **Development of British Values** Equality and individual liberty (Self-help, equality and self-responsibility) White developed countries have access to clean drinking water. Poorer under-developed countries do not. **Cultural Capital** Coffee shop analogy of filtered/ground/coffee machines may not be familiar to all. References to distillation of sea water in wealthy middle eastern countries may not be something students are geographically acquainted.	The particle model and the concepts linked are vital to tackle more complex concepts further in the curriculum such as structure and bonding, fractional distillation, atomic structure and the periodic table and particle model of matter

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Carousel – Term 1	**7a forces** Speed and Gravity	Knowledge - If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction. Understand that a force is a push or pull, the unit of force is the Newton. Understand the terms resultant force, equilibrium. Calculate speed. Understand the concept of relative motion, distance-time graphs and gravity, mass and weight.	**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* **Cultural Capital** Mass and Weight lesson can be broadened out to talking about different planets. Lessons on speed can discuss cars, and relative speeds. Getting pupils to estimate typical speeds can correct misconceptions borne out of a lack of knowledge.	Students build on previous forces knowledge acquired previously in KS2. They use newly acquired skills in the first 6 lessons to practice the concepts introduced such as tabulating data and creating line graphs. Skills and knowledge acquired in this topic allow students to build on more complex tasks further in the curriculum such as resultant forces and work done, velocity-time graphs, acceleration and displacement.

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Carousel – Term 2	**7f reactions** Acids and Alkalis Metals and non-metals	Knowledge - The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Understand that mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water. Describe an oxidation, displacement, or metal acid reaction with a word equation. Use particle diagrams to represent oxidation, displacement and metal-acid reactions. Identify an unknown element from its physical and chemical properties. Progress - Place an unfamiliar metal into the reactivity series based on information about its reactions	**Practice of tier 3 literacy include:** Analyse Interpret Range Environment Investigate Estimate Identify **Links to careers in:** Medicine manufacture Fabric manufacture Building materials - builder Environment agency pH/water sampling Cleaner (concentrations Pharmacist (neutralisation) Gardener (pH of soils) Musician (alloys) Plumber (pipe corrosion) Rail engineer (thermite **Development of employability skills:** Communication (equations) Numeracy (pH Scale and concentrations) Team-work (practical skills) **Development of British Values** Mutual respect **Cultural Capital** Waste water treatment plant (near Trafford Centre) Gardening/plant material = indicators Acid rain/lakes Musical instruments/alloys Military jets/mountain rescue firing magnesium flares	Students' progress and build on knowledge and skills from the previous matter topic. The skills and knowledge acquired during this topic allows students to tackle more challenging concepts further through the curriculum such as chemical changes, quantitative chemistry, energy changes and the rate and extent of chemical change

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Carousel – Term 2	**7d Waves** Sound and light	Knowledge - To understand sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the wavelength), the higher the pitch. Apply the knowledge of sound to the function of the ear and hearing To understand that when a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection (law of reflection). The ray model can describe the formation of an image in a mirror and how objects appear different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal (law of refraction) Practise - Refraction through lenses and prisms can be described using a ray diagram as a model. Apply the knowledge of light to the structure and function of the eye, seeing colour and frequency.	**Practice of tier 3 literacy include:** Calculate Interpret Investigate Compare Explain **Links to careers in:** Audiologist Optometrist Musician Sound technician **Development of employability skills:** Numeracy Self-management Problem solving Communication **Development of British Values** Self-help Self-responsibility **Cultural Capital** Use of telescopes to see light travel from distant objects Trips to observatories at Preston or Jodrell Bank	The knowledge of waves builds on previous knowledge covered in the matter topic. It covers in a different context the basic concepts of the particle model. The concepts of waves underpins the knowledge required in more challenging parts of the curriculum and more complex tasks such as electromagnetic waves, investigating waves, frequency, period and wave speed.

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Carousel – Term 2	**7h organisms** Movement Cells	Knowledge - The parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Understand that antagonistic pairs of muscles create movement when one contracts and the other relaxes. Multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. Understand there are many types of cell. Each has a different structure or feature so it can do a specific job. Be able to label plant and animal cells, identify specialised cells. Explore Diffusion in uni and multi-cellular organisms.	**Practice of tier 3 literacy include:** Accurate Average Same Improvements Units Reason Observe **Links to careers in:** Nurse/doctor Gardener Physiotherapist Occupational therapist Radiographer Sportsperson Cell biologist **Development of employability skills:** Numeracy Team work Communication Creativity Informed **Development of British Values** Rule of Law Tolerance Mutual respect Individual liberty **Cultural Capital** There are opportunities to discuss organ donation. Are students aware of organ donation? Have students been in a hospital setting? Are students members of sports clubs? (skeleton/muscles) Have students completed a first aid course? How familiar are students with plants? Do they have gardens or window boxes? Do they go to the park? Some students have experience of microscopes at home through Christmas and birthday presents, but many wont.	Progression from previous KS2 knowledge of cells. Cells and organisation underpin the majority of future deeper concepts covered in the curriculum. Movement in and out of cells by diffusion builds on the concepts previous covered in the matter topic. Students require this knowledge to tackle more complex concepts such as microscopy, cell differentiation, stem cells, organisation and exchanging substances covered further in the curriculum.

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Carousel – Term 3	**7j Genes** Variation and Human Reproduction	Knowledge – Understand there is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Understand that variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. Understand that the menstrual cycle prepares the female for pregnancy (fertilisation and implantation) and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances. Change that occur during adolescence. Label the Male and female reproductive systems.	**Practice of tier 3 literacy include:** **Links to careers in:** Because Bar Chart Continuous Discontinuous Describe Line Graph Pattern Range Tabulate Trend Units **Development of employability skills:** Midwife Nurse Counsellor **Development of British Values** Tolerance of Different cultures and Religions. Mutual Respect. **Cultural Capital** Birth. Male and Female Reproductive system. Contraception. Blood Groups. Stigma of left/Right handedness. Ginger hair gene. Genetic versus Environmental. Chosen body differences. Changes during puberty. Pregnancy myths.	Students are able to build upon the knowledge of specialised cells acquired in the previous organism's topic on cells. They can progress their skills on graphs and bar charts introduced in skills in term 1. The concepts taught here underpin deeper learning on meiosis, mitosis, reproduction, genetic inheritance and evolution further in the curriculum.

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Carousel – Term 3	**7c energy** Energy costs Energy transfer	Knowledge - We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. Understand that when energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy. Awareness of different energy resources/stores. Energy and power.	**Practice of tier 3 literacy include:** Calculate Data Environment Explain Identify Research Environment **Links to careers in:** Energy companies Oil rig engineer Dietician Solar power engineer Analyst Designer Sales **Development of employability skills:** Team work Numeracy Creative Informed **Development of British Values** Self-help Self-responsibility Equality **Cultural Capital** Solar panels/wind farms STEM Club Power stations	The concepts and skills covered during this topic underpin more complex tasks further in the curriculum such as energy stores and systems, energy transfers, energy efficiency and conservation of energy.

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Carousel – Term 3	**7i Ecosystems** Interdependence and plant reproduction.	**7i ecosystems** Knowledge – Understand that organisms in a food chain or food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. Understand that the population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary. Identify the structural parts of a flower.	**Practice of tier 3 literacy include:** Because… Describe Explanation Hazardous Observe **Links to careers in:** Botany Wildlife trust Protecting ecosystems Conservation **Development of employability skills:** Creativity – create a model flower Informed **Development of British Values** Self responsibility Tolerance of different cultures and religions Rule of law **Cultural Capital** Awareness of different food chains + organisms within them (some won't be aware of certain species or where they come in a food chain) Widen awareness on food chains – tropical/aquatic Flower structure – try to do a dissection to give tangibility to the parts – may not be familiar to all students	Students build upon previous knowledge acquired during the genes topic on reproduction. The progression of knowledge allows them to tackle more challenge concepts of the future curriculum such as ecology and abiotic/ biotic factors.