Manchester Academy
The best in everyone

Science Big Pictures 2025 – 2026

Year 7

Autumn 01	*Autumn 02*	*Spring 01*
Content: 7.01: Particles This unit introduces the fundamental concepts of energy stores and pathways. The focus is on the concepts of energy transfer between stores via pathways and the conservation of energy. In the examples, students will be introduced to the chemical store of energy, kinetic store of energy, elastic store of energy, gravitational store of energy, and thermal store of energy; students are not yet expected to learn about electromagnetic, vibration or nuclear stores of energy. They are introduced to transfer pathways: mechanically, electrically, heating, by radiation and by chemical reaction. **Particles** The unit introduces the particle model (without mentioning the atom or subatomic particles) and uses the particle model to illustrate solutions and other mixtures. **Substances** This unit focus on physical properties of substances and physical changes: changes of state, solutions (and other mixtures) and separating these solutions. **Matter** Students learn how the particulate model of matter – and the arrangement, movement and forces of attraction between particles – can explain the changes of state (seen in KS2), melting and boiling points, evaporation below boiling points, diffusion, physical properties of matter in the solid, liquid and gas states (including gas pressure) and dissolving.	**Content:** 7.02: Fundamentals of Physics **Motion and Forces** This unit builds on the foundations of KS2 and ensures students understand the fundamentals of forces: that forces which arise when objects push or pull on each other, have a given direction and size that act on an object and can change the motion or shape of it. They arise in pairs, and their direction and size can be modelled with arrows. Students are taught about resultant forces when forces are balanced (zero resultant force) and unbalanced (non-zero resultant force) forces. They revisit contact and non-contact forces (KS2) and name air resistance, friction, lift, normal contact force, thrust, upthrust, water resistance (contact) and gravity and magnetic forces (non-contact). **Energy (which spans all themes)** This unit introduces the fundamental concepts of energy of energy transfer between stores via pathways and the conservation of energy. In the examples, students will be introduced to the chemical store of energy, kinetic store of energy, elastic store of energy, gravitational store of energy, and thermal store of energy; students are not yet expected to learn about electromagnetic, vibration or nuclear stores of energy. They are introduced to transfer pathways: mechanically, electrically, heating, by radiation and by chemical reaction.	**Content:** 7.03: Cells, Tissues and Organs **Cells and Life** Students review the difference between living, dead, and never alive things (KS2) and are introduced to cells as the building blocks within tissues, organs and organ systems. They are taught the components of animal and plant cells and examine some specialised cells. Students review needs of animals and plants (KS2) and are taught that all cells need oxygen and glucose for respiration, the process by which energy is released, and all cells need to excrete carbon dioxide and water as waste products of this process, and that this happens by diffusion. **Inheritance and Reproduction** Students are introduced to the nucleus of a cell as the organelle that contains the genome, which controls the cell's activities. Within this unit, a simple placeholder definition is used: 'The genome is a cell's set of instructions for growth, development and life processes.' In a later unit, students will build on their knowledge of the genome to understand inheritance, genes and DNA. **Variation and Evolution** Students revisit the idea of adaptations (KS2) in the context of specialised cells. **Particles** Students are reminded that cells – the building blocks of living things – are made of particles (7.01).
Assessment objectives: Describe the arrangement of particles of a solid, liquid and gas, and link this to their properties Explain changes of state in terms of the particle model Classify substances as pure and impure, and describe techniques to separate mixtures	**Assessment objectives:** Describe examples of energy transfers Describe how thermal energy transfers from one place to another Apply the law of conservation of energy to situations involving energy transfers Distinguish between power and energy	**Assessment objectives:** Use a microscope to produce an image of a cell in focus Label plant and animal cells; state the function of the organelles; and compare plant and animal cells Describe the relationship between cells, tissues and organs: and describe the functions of the main organ systems

	Compare values of energy and power using appropriate SI values Compare different fuels and energy resources Use diagrams with correctly labelled force arrows to display a range of forces in different situations Interpret force diagrams to determine the motion of an object Calculate pressure, weight and average speed using appropriate equations Relate the description of a journey to a distance-time graph Formal IPT in topics studied	Formal IPT in topics studied Formal IPT in topics studied Big test 1: Mid year exam

Spring 02	***Summer 01***	***Summer 02***
Content: 7.04: chemical changes **Particles** Having understood the fundamentals of particles (7.01), students are introduced to atoms, molecules and elements, and then compounds. They are taught how to represent these in diagrams and with symbols and chemical formulae. **Substances** Applying their understanding of elements and compounds, students are taught how the properties of compounds are different to those of the elements from which the compounds are made. **Chemical Reactions** With knowledge of atoms and molecules, students are introduced to chemical changes as a rearrangement of atoms. They represent reactants and products in diagrams, word equations and symbol equations (though they do not yet balance equations). They develop the idea of the conservation of mass (first taught in the context of physical changes in 7.01) in this context. Students observe the evidence for chemical changes, and focus on oxidation, thermal decomposition, combustion, as well as exothermic and endothermic reactions.	**Content:** 7.06: Sound and Light This is a new unit for Year 7. It supports transition by bridging the gap between KS2, where students are introduced to sound and light, and to the idea of waves, which is now taught in Year 9. **Waves** Students build on their knowledge of sound being caused by vibrations and what changes its loudness and pitch (KS2), to understand how sound is transmitted via particles (7.01); how it can be absorbed, reflected and scattered; and what affects its speed as it is transmitted. They also revisit how humans hear. Students develop their knowledge of light emanating from a source to illuminate objects, which is how we see them, and how shadows are evidence for light travelling in straight lines (KS2) to understand how whole areas can be lit up and how surfaces affect the reflection of light. They learn how humans see and what colour is; they explore what images are, including how refraction acts through lenses. Energy pathways related to light and sound are introduced. **Particles**	**Content:** 7.08: Life Cycles **Inheritance and Reproduction** Students revisit the vocabulary of genome (7.03) and are taught that the genome is the complete set of genetic information in any organism, organised into chromosomes. Chromosomes are structures made of DNA. Genes are specific segments of DNA on chromosomes that provide instructions for cell processes and determine inherited traits. Offspring inherit half their genome from each parent. Students are introduced to the idea that growth refers to an increase in the number of cells, and that this happens when cells enlarge and divide (without going into the detail of mitosis stages). Development involves changes in form and function as an organism matures, including developing specialised cells (7.03). Students revisit the life cycle of humans (KS2) and are taught about the male and female reproductive systems, the processes of fertilisation, gestation, growth and development from embryo and birth, as well as growth and development from birth to adolescence and senior. Students revisit the life cycle of plants (KS2) and are taught the sexual reproductive systems and asexual reproduction in some plants and bacteria. **Variation and Evolution** Students are introduced to variation, including continuous and discontinuous variation and genetic and environmental variation.

7.05 Organ Systems **Cells and Life** Students are taught about unicellular organisms and build on knowledge of what cells need for respiration (7.03). Students are taught about the gas exchange system and build on their knowledge of the digestive system and circulatory system in humans (KS2). They are taught these systems' role in breaking down larger molecules into smaller ones and/or transporting molecules in and out of cells via diffusion. Students are introduced to other organ systems, including the human skeleton and muscles in more depth than KS2. **Variation and Evolution** Students revisit the idea of adaptation in the context of unicellular organisms and specialised cells (7.03). Students look at the adaptations of cells, tissues and organs within the digestive system, circulatory system and gas exchange system. **Particles** Students revisit molecules (7.04) in the context of the gaseous exchange, digestive and circulatory systems in humans. They see how oxygen and carbon dioxide molecules are transported by diffusion, and how large molecules are broken down into smaller molecules in digestion. **Motion and Forces** Students apply knowledge of forces (7.02) to the various forces that can be applied by skeletal muscles in the body.	Students apply their knowledge of particle arrangement (7.01) in each state to explain how sound is transmitted through matter. **Health** In the context of seeing and hearing, students are taught how lenses can correct vision and how hearing aids and other technology can be used to support those with hearing loss or deafness. 7.07 Materials This is a new unit for Year 7 (it was previously taught in Year 8). It has been moved to Year 7 because it is conceptually simpler – and easier for students to understand and master – than some of the topics that were previously covered in Year 7, such as acids and alkalis. Given that KS2 focuses so much on the physical properties of materials, teaching this unit in Year 7 supports students' transition into secondary science. Introducing polymers as having large molecules with repeating units in this year unit allows students to consider proteins and carbohydrates as polymers in Year 8. **Substances** Students build on understanding of properties of materials and how these relate to their use (KS2) by considering the properties and use of composite materials. They are introduced to polymers and ceramics and compare these to metals.	They consider the importance of variation within a species. At this stage, they do not explicitly link variation with adaptations. Separately, they revisit adaptations of specialised cells (7.03, 7.05) in male and female gametes.
Assessment objectives: Identify substances as acid, alkali or neutral based on observations with indicators and the pH scale Describe neutralisation in terms of acids and alkalis reacting Formal IPT in topics studied	**Assessment objectives:** Formal IPT in topics studied	**Assessment objectives:** Label the parts of the structure of the male and female reproductive system and describe their function Describe the processes of menstruation and fertilization and identify the stages of gestation and birth Describe the function of each part of the flower and explain how pollination occurs Evaluate different seed dispersal techniques in plants Identify variation between individuals of a species and state the differences between species, describing the difference between

		continuous and discontinuous variation Formal IPT in topics studied Big test 2: UL end of year papers