Subject	Year 7 Threshold Concepts – Autumn Term	How to support students' learning
Welcome to Science	<u>Safety in the laboratory and laboratory apparatus</u> • Evaluate risks, identifying features of investigations which are considers as hazards and risk and identifying ways to control these • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety • Understand and use SI units and IUPAC chemical nomenclature <u>Using the Bunsen burner</u> • Evaluate risks • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety <u>Predicting and planning an investigation</u> • Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate • Present observations and data using appropriate methods, including tables and graphs <u>Describing patterns and evaluating</u> • Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions • Present reasoned explanations, including explaining data in relation to predictions and hypotheses • Evaluate data, showing awareness of potential sources of random and systematic error	Encourage your child to visit BBC bitesize to learn about lab safety Working safely in the lab - Working scientifically - KS3 Science - BBC Bitesize - BBC Bitesize Encourage your child to visit BBC bitesize to learn the names of key apparatus and learn how to draw them correctly. KS3 Science - Working Scientifically - Drawing scientific apparatus - BBC Bitesize - BBC Bitesize Learn how to use the Bunsen burner correctly by watching this video How to use a Bunsen burner safely - YouTube Encourage your child to visit BBC bitesize to read about how to plan an investigation, make a prediction, collect results and describe patterns in the data Planning an experiment - Working scientifically - KS3 Science - BBC Bitesize - BBC Bitesize Encourage your child to have a go at one of these kitchen science experiments (with supervision) Kitchen science activities - Science Museum Group Learning

Particles	<u>Properties of solids, liquids and gases</u> • Describe the properties of the different states of matter in terms of the particle model <u>Heating solids and liquids and diffusion</u> • Know happens to particles when they are heated • Describe diffusion in terms of the particle model • Describe diffusion and the movement of particles <u>Changes of state</u> • Describe changes of state in terms of the particle model • Make observations where substances change temperature or state can be described in terms of particles gaining or losing energy <u>Gas pressure</u> • Describe gas pressure • Explain the effect of gas pressure on containers • Describe and explain the effect of temperature on gas pressure in terms of particles <u>Pure and impure substances</u> • Define a pure substance and link this to melting and boiling points • Define a mixture • Describe simple separation techniques • Explain filtration in terms of particles <u>Solubility</u> • Define the term solubility and determine the solubility of a salt in a given solvent • Describe the effect of temperature on solubility	• Encourage your child to look around the how to try and identify examples of solids, liquids and gases • Encourage your child to watch this video about changes of state Changes of State | Properties of Matter | Chemistry | FuseSchool - YouTube • Encourage your child to visit BBC bitesize to learn about gas pressure Gas pressure - BBC Bitesize • Encourage your child to visit BBC bitesize to learn about pure and impure substances Pure and impure substances - KS3 Chemistry - BBC Bitesize

Cells	Methods of separating mixtures • Describe how the following processes work to separate a mixture - Filtration, Evaporation / crystallisation, chromatography, distillation Using microscopes • Explain cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope Life processes and cell structure • Describe cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope • State the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts • Describe the similarities and differences between plant and animal cells • Know that some cells have specialised functions Single celled organisms and diffusion • Explain the role of diffusion in the movement of materials in and between cells • State the structural adaptations of some unicellular organisms	• Watch this video to see distillation apparatus and how it is used Distillation Practical | Chemistry Practicals | GCSE Science Practicals - YouTube • Encourage your child to watch this video about how chromatography can be used to separate colours Key Stage 3 Chemistry - Chromatography - YouTube Encourage your child to visit BBC bitesize to learn about a range of methods used to separate a mixture Separating solids from liquids – filtration - Separating mixtures - KS3 Chemistry Revision - BBC Bitesize

	Cells, tissues, organs and systems. • Understand the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms Classification, habitats and adaptations. • Understand the basics of the animal classification system.	Encourage students to watch this video to consolidate knowledge: How to use a Microscope | Cells | Biology | FuseSchool - YouTube Encourage students to look through these relevant pages on BBC bitesize: Animal cells and plant cells - Cells to systems - KS3 Biology Revision - BBC Bitesize Encourage students to read through this information and take the relevant topic test Unicellular organisms - Cells to systems - KS3 Biology Revision - BBC Bitesize Encourage your child to draw out the hierarchy of organisation within a human using this video as help GCSE Biology - Levels of Organisation - Cells, Tissues, Organs and Organ Systems #13 - YouTube Encourage your child to learn the key terminology for progression into KS4: KS3 Classification Glossary - Schools (chesterzoo.org)

Forces and motion – Making objects move	<u>Forces</u> • Identify key forces acting on an object and the equipment used to measure forces • Understand the effect balanced forces can have on an object • Name different types of frictional forces and the effect they have on motion • Describe factors that can increase or decrease resistive forces <u>Measuring Speed</u> • Understand how the speed of an object can change when a balanced force is applied to it. • Determine the speed of an object using simple apparatus (stopwatch and metre ruler) • Calculate the speed of objects <u>Distance – Time Graphs</u> • Describe the journey of an object from a distance-time graph	Read through this webpage with your child and complete the quiz at the end. Introduction to forces - Forces and movement - KS3 Physics - BBC Bitesize - BBC Bitesize Watch this video to understand the effect of balanced and unbalanced forces: Balanced & Unbalanced Forces | Forces & Motion | Physics | FuseSchool - YouTube Encourage students to carry out their own investigation into air resistance. This link provides a simple experiment they can do at home with objects you can find around the house: https://www.giftofcuriosity.com/wind-resistance-experiments-for-kids/ Watch this video to help you understand how to calculate speed. Have a go at calculating speed, it could be while you are running in the garden or on a walk to the shops. Speed Distance Time | Forces & Motion | Physics | FuseSchool - YouTube This video is a good revision resource for distance-time graphs: https://www.youtube.com/watch?v=DkCw2C-DkT0 Ask students to attempt sketching a distance-time graph for a journey they have completed at home.

	• Construct a distance-time graph using data • Interpret a distance-time graph using data to support your understanding <u>Speed – Time Graphs</u> • Describe the journey of an object from a speed-time graph • Construct a speed-time graph using data • Interpret a speed-time graph using data to support your understanding	This website provides a useful resource to support your student with understanding speed-time graphs: https://www.bbc.co.uk/bitesize/guides/z2b9hv4/revision/4
Energy	<u>Energy Stores and Transfers</u> • Describe the main energy stores • Understanding the conservation of energy and apply it to energy transfers <u>Efficiency</u> • Recall the equation for efficiency • Apply efficiency calculations to energy transfer diagrams • Describe how to use a Sankey diagram to represent efficiency	Encourage your child to watch this BBC lesson on conservation of energy: Conservation of Energy | Physics – Wonders of Life - YouTube Students can revise their knowledge of the energy stores using the information on this page: Energy stores - Energy - KS3 Physics - BBC Bitesize - BBC Bitesize Ask students to predict the efficiency of different objects in the home (e.g. television, light bulb, hair dryer, games console, etc) Encourage students to then research the efficiency of these different devices to see if their prediction matches the information found.

Humans	<u>Non-Renewable Energy Resources</u>
	• Discuss the advantages and disadvantages of non-renewable energy resources:
	  ○ Coal
	  ○ Oil
	  ○ Gas
	  ○ Nuclear
	
	<u>Renewable Energy Resources</u>
	• Discuss the advantages and disadvantages of renewable energy resources such as:
	  ○ Solar
	  ○ Wind
	  ○ Geothermal
	  ○ Wave
	  ○ Tidal
	  ○ Biomass
	
	<u>The respiratory system and breathing</u>
	• Describe the structure and functions of the gas exchange system in humans, including adaptations to function
	• Explain 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
	• Describe the impact of exercise, asthma and smoking on the human gas exchange system
	
	<u>Effects of exercise on the respiratory system</u>
		Students can revise their understanding of non-renewable energy resources using this website:
		Non Renewable Energy Resources - Shalom Education (shalom-education.com)
		
		Encourage your child to look at live information about the electricity being produced in the UK by visiting this website:
		Dashboard - MyGridGB
		
		Encourage your child to have a go at creating a carbon free electricity mix for the UK using this online game:
		Net Zero Energy Challenge: EnergyMixer
		
		Use these resources to refresh your child's knowledge of planning an investigation 20210914075053_Welcome to science D and E for isolating students.pptx (live.com)
		
		Encourage your child to take this quiz to learn key terminology and facts for this topic KS3 Respiratory System - Quizizz

Chemical reactions	• Explain the impact of exercise, asthma and smoking on the human gas exchange system <u>The skeleton, joints and muscles</u> • State the structure and functions of the human skeleton, to include support, protection, movement and making blood cells • Have an understanding of biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles • Describe the function of muscles and examples of antagonistic muscles <u>Elements and the periodic table</u> • Define an element • Recognise chemical symbols and formula for elements and compounds • Describe principles underpinning the Mendeleev Periodic Table • Understand how the periodic table is arranged: periods and groups; metals and non-metals • State that elements are arranged in order of increasing atomic number • combustion • State a health hazard associated with incomplete combustion • Describe the properties of metals and non-metals	Encourage your child to read through the information here: Effects of training and exercise - Effects of exercise and training - GCSE Physical Education Revision - BBC Bitesize Encourage your child to do this quiz to identify misunderstandings within this topic: Skeleton, Joints and Muscles - revise KS3 science with fun quizzes (educationquizzes.com) Encourage your child to do this quiz to identify misunderstandings within this topic: Skeleton, Joints and Muscles - revise KS3 science with fun quizzes (educationquizzes.com) Encourage your child to watch this video about how the periodic table is arranged (1525) KS3 - The Periodic Table - YouTube Encourage your child to use BBC bitesize to read about elements, compounds and mixtures, watch a short video and complete the quiz Elements, compounds and mixtures - BBC Bitesize

	Forming compounds • Give the definitions for atoms, elements and compounds • Describe what happens in chemical reactions as the rearrangement of atoms • Represent chemical reactions using formula and equations • Name common compounds Elements, compounds and mixtures • Be able to use chemical symbols and formula for elements and compounds • Describe the differences between atoms, elements and compounds • Describe how the properties of elements and the compounds they form are different • Identify elements, compounds and mixtures from diagrams Indicators of chemical reactions • Describe evidence for a chemical reaction • Apply conservation of mass to simple chemical changes • Explain why, in terms of particles, mass stays the same in a reaction Physical and chemical changes • Give examples of physical changes and chemical reactions • Describe what happens in both a chemical and physical changes Oxidation • Define oxidation reactions • Write word equations for chemical reactions • Apply conservation of mass to oxidation reactions Combustion	Here is a video to help summarise the difference between elements, compounds, mixtures and heir properties What Is An Element, Mixture And Compound? | Properties of Matter | Chemistry | FuseSchool - YouTube Here is a video summarising conservation of mass Conservation of mass - YouTube Encourage your child to visit BBC bitesize to learn about combustion and burning fuels What is combustion? - BBC Bitesize Here is a task that can be used to stretch and challenge your child Unit05.indd (ttsonline.net)

	Acids and alkalis • **describe the colour change of litmus indicator with different substances** • **Explain the difference between acids and alkalis.** • **Define a neutral substance** pH scale • Classify substances as strong or weak acids and alkalis based on their pH • **Explain why it is better to use universal indicator over other indicators** Indicators • Name a selection of indicators • **Extract red dye from cabbage to use to make indicator** Neutralisation • Describe what happens to the pH when an acid is added to an alkali or vice versa • Represent the reactions of acids and alkalis using word equations Investigation – antacid • Write a method, identify variables, design a table to collect results • Check results for reproducibility	Encourage your child to visit the BBC bitesize website to learn about acids, alkalis and neutralisation reactions Acids and alkalis - KS3 Chemistry - BBC Bitesize Encourage your child to watch this video covering the basics about pH scale, universal indicator and litmus paper What Is The pH Scale | Acids, Bases & Alkalis | Chemistry | FuseSchool - YouTube