Science Curriculum Unit Overview Year 8

Students will be assessed during class using questioning, quick quizzes, group activities and low stakes testing. They will be provided with knowledge organisers that clearly sets out a checklist of concepts required for that topic. End of topic tests will give a clear indication of knowledge that still needs to be embedded and then targeted tasks will be issued to students as and when required. Homework will occasionally be based on previous topics and not current topics, so that additional judgements can be made on student's progress.

Science lends itself to interleaved learning (a process where students mix, or interleave, multiple subjects or topics while they study in order to improve their learning) and many concepts and topics are often naturally revisited in our Science learning journey. Prior knowledge is checked before moving on to ensure no student is left behind.

1. **Knowledge** refers to information or awareness gained through experience or **education**. It is the **facts** we are taught**.**
   Understanding is when the facts/knowledge are placed into a wider context, such as realizing the intended meaning or cause.

2. **Mastery** keeps learning outcomes constant but varies the time needed for pupils to become proficient or competent at these objectives. Mastery learning breaks subject matter and learning content into units with clearly specified objectives which learners work through in a series of sequential steps and must demonstrate a high level of success, typically about 80%.

3. Links to **prior learning** in previous years and key stages, where appropriate. What is in the KS2 national curriculum?

Biology – 8A Food and Nutrition				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Nutrients **Uses of nutrients** **Balances Diets** **Digestion** **Absorption**	**Knowledge:** Identify main food groups, nutritional information labels, a balanced diet, effects of deficiency diseases and junk food on health. Describe the main parts of the digestive system, digestion and absorption (effect of surface area) and diffusion, transport and uses of nutrients. **Understanding:** What are the main food groups and their roles in health? How a balanced diet affects health and disease, malnutrition and deficiency disease. Identify the main parts of the digestive system. What are the main steps of digestion, role of surface area and absorption? Describe how sugars are transported from the gut to cells to release energy by respiration **Skills:** A literacy and communication opportunity that looks at weighting and bias in writing Working Scientifically opportunity on the importance of surface area in biology. **Literacy and Communication Skills** Making effective notes from text, including different ways of organising notes depending on purpose	Knowing the content of a healthy human diet: carbohydrates, lipids (fats & 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 adaptions 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.	**From KS2 most students will be able to:** Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (Year 6) **From KS3:** From previous units, most students will be able to: Recall the main parts of the digestive system (7A) Describe how some cells are adapted to the functions (7A) Describe how soluble substances are carried by blood (7C) Explain the importance of a healthy skeleton (7C) Recall some of the effects of alcohol on the body (7C) Describe how animals depend on other animals and plants for food (7D) Describe what happens during diffusion, in terms of particles (7G) Compare energy values of different food using labels, including interpreting nutrition information labels (7I)	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Biology – 8B Plants and their Reproduction				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Classification and Biodiversity **Types of Reproduction** **Pollination** **Fertilisation and Dispersal** **Germination and Growth**	**Knowledge:** Biodiversity is important All living things are classified into five Kingdoms Sexual reproduction and asexual reproduction in plants. Processes of pollination and fertilisation. Flower structure. Variation among different plants. Different life cycles. **Understanding:** Explain why preserving Biodiversity is so important. Identify typical characteristics of each of the five Kingdoms. Describe how plants such as strawberries reproduce asexually. Describe how pollination leads to fertilisation. Describe how the parts of a flower and a seed are adapted to their functions. Describe fruit and seed formation. Describe fertilisation at a cellular level. Describe germination. Show a plant's life cycle as a diagram. **Skills: Literacy:** Information can be presented in different ways to communicate scientific ideas clearly. This includes understanding paragraph construction (using ideas of unity, cohesion and order) to develop logical and fluid text that communicates information clearly. **Maths:** Use appropriate units for area measurements Calculate areas for squares and rectangles Use a sample to calculate an estimate of population size.	Can explain why Biodiversity is essential. Can identify a feature as environmental or inherited. Can place an organism into kingdoms. Can compare asexual and sexual reproduction in plants. Identify the different parts of a flower and describe their role in reproduction. Explain why seed dispersal is important. Use a diagram to show a plant's life cycle.	**This will build on previous learning from KS2:** Most students will be able to: Describe the life process of reproduction in some plants and animals (Year 5). **This will build on previous learning in units:** Most students will have covered: 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).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Biology – 8C Breathing and Respiration				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Aerobic Respiration **Gas Exchange System** **Getting Oxygen** **Comparing Gas Exchange** **Anaerobic Respiration**	**Knowledge:** Aerobic respiration chemical process. Need for energy. The lungs are adapted for gas exchange. Breathing, ventilation, gaseous exchange. Effects of exercise Tobacco smoke contains harmful chemicals. Anaerobic respiration. **Understanding:** Describe how respiration can be detected using [limewater, hydrogen carbonate indicator, temperature]. Adaptations of lungs for gas exchange. Describe how muscles produce breathing movements. Describe the functions of the main parts of the human gaseous exchange system. Describe how asthma, emphysema and tobacco tar can reduce gas exchange. Explain why aerobic and anaerobic respiration occur in humans at the same time. Describe how lactic acid is removed from tissues. **Literacy & Communication skills:** Information can be presented in different ways to communicate scientific ideas clearly. This includes understanding how sentences can be constructed to show cause and effect. **Maths skills:** Identify the ranges of readings in data, explain why data with a small range is of good quality, calculate means and explain their use, identify anomalous results in data.	Competent practical work to demonstrate respiration. Explain the process of aerobic respiration in context. Identify the different parts of the respiratory system and describe their role. Identify differences between gas exchange, breathing and ventilation. Discuss the effects of exercise on gas exchange and breathing. Summarise the effects of cigarette smoke on the respiratory system. Explain the process of anaerobic respiration in context.	**This will build on previous learning from KS3:** From Year 7, most students should be able to: Recall how cells, tissues, organs and organ systems are related (7A) Describe how some cells are adapted for certain functions (7A, 7B, 7C) Recall that respiration and breathing are not the same (7C) • Describe how certain drugs affect the body (7C) Describe how the circulatory system carries food and oxygen around the body (7C) Describe diffusion (7G) Explain the concept of air pressure (7G).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Biology – 8D Unicellular Organisms				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Unicellular or Multicellular **Microscopic Fungi** **Bacteria** **Protoctists** **Decomposers and Carbon**	**Knowledge:** What are unicellular animals – recognising that there are different types and the differences between them. How unicellular organisms can be photosynthetic organisms. Anaerobic and aerobic respiration. **Understanding:** Why is there no virus kingdom? Why do multicellular organisms need efficient transport systems? What are the key characteristics of the five kingdoms into which organisms are classified? How and why, we use anaerobic respiration for goods that we use. How these organisms can cause diseases like the Black Death and how they spread. How do bacteria reproduce? How can we use scientific evidence to test different hypotheses about the Black Death? **Skills:** Develop practical skills in scientific investigations and communication skills through writing up predictions and methods including correctly labelled apparatus and clear instructions; discussions in pairs and within the whole class; writing up dialogues. Develop analytical, evaluation, comparing and critical thinking skills. **Literacy & Communication skills:** Information can be presented in different ways to communicate scientific ideas clearly. This includes understanding how modal verbs are used to express certainty. **Math skills:** Identify pie charts; describe what a certain pie chart shows; extract simple information from pie charts; present data in pie charts; identify when to use a pie chart.	Know what unicellular organisms are, the similarities & differences between them. Know cells are the fundamental unit of living organisms: observe, interpret, and record cell structure using a light microscope. Know that most life on Earth depends on the ability of photosynthetic organisms to use sunlight to build organic molecules and to maintain levels of oxygen and carbon dioxide in the atmosphere. Know the differences between aerobic and anaerobic respiration, the process of anaerobic respiration and fermentation. Know the role of diffusion in the movement of materials in and between cells. Know the structural adaptations of some unicellular organisms. Know the hierarchical organisation of multicellular organisms. Know the carbon cycle (Chemistry).	**This will build on previous learning from:** From KS2 most students will be able to: recall that microorganisms are tiny living things (Year 6). From Year 7, most students should be able to: recall the seven life processes (7A); Recall how cells, tissues, organs and organ systems are related (7A); Describe how some cells are adapted for certain functions (7A, 7B, 7C); Describe how organisms are interdependent in an ecosystem (7D); Describe diffusion (7G).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Chemistry – 8E Combustion				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Burning Fuels **Oxidation** **Fire Safety** **Air Pollution** **Global Warming** **Reducing Pollution**	**Knowledge:** State the meaning of fuel, hydrocarbon, combustion and oxidation. Name the three sides of the fire triangle. Recall examples of renewable and non-renewable fuels and their sources. Recall the fuel used in fuel cells. Describe the combustion of hydrocarbons (in terms of reactants and products) and identify with a word and symbol equation. Describe the reaction of combustion of metals with oxygen. State what happens to mass in a chemical reaction. Describe what is meant by exothermic changes and recall examples of exothermic and endothermic reactions. State the names of some non-metal oxide pollutants. Recall examples of pollution caused by burning [fossil fuels, impurities in fuels]. Describe the reaction of acids with [metals, bases, alkalis, carbonates]. Recall which salts are produced by which acids. State the meaning of neutralisation, base, alkali Recall reasons why the temperature on the Earth varies over time. State the meaning and effects of global warming, climate change and greenhouse effect **Understanding:** Describe the factors that make up a good fuel. Describe how ethanol can be produced and used and what happens in a fuel cell. Explain the products formed by the complete combustion of hydrocarbons and metals. Supply missing reactants or products to complete a word and symbol equation. Explain the change in mass seen in reactions Use the idea of the fire triangle to explain how to extinguish a fire. Classify changes as [exothermic, endothermic] from temperature changes. Explain how [carbon monoxide, sulfur dioxide, nitrogen oxides] are produced in some combustion reactions and can cause acid rain. Explain how everyday examples of neutralisation [e.g. indigestion remedies, treating insect stings, toothpastes] work. Explain how neutralisation is used to reduce the effects of acidic pollutants. Describe how temperature, concentration, surface area, catalysts affect the rate of a reaction and how catalytic converters in cars work. Explain how human activity affects the levels of carbon dioxide in the atmosphere. Explain how atmospheric gases, carbon dioxide helps to cause the greenhouse effect.	Know what combustion and oxidation reactions are. Know what catalysts do? Know what an exothermic chemical reaction is. Know the fire triangle and how to put out a fire by removing one of the elements. Know what the carbon cycle is and the composition of the atmosphere. Know that burning fuels especially with impurities will result in air pollution. Know the production of carbon dioxide by human activity and the impact on climate. Working Scientifically Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate. Literacy & Communication skills Distinguish between information and explanation texts Use information and explanation texts to answer different types of question. Maths skills Interpreting line graphs.	**This will build on previous learning from KS3:** From previous units, most students will be able to: Define the term fuel (7I) Name the three states of matter and describe their properties (7G) Describe features of chemical reactions (7F, 7H) Be able to carry out the test for carbon dioxide (7H).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Chemistry – 8F The Periodic Table				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Dalton's Atomic Model **Chemical Properties** **Mendeleev's Table** **Physical trends** **Chemical trends**	**Knowledge:** A simple (Dalton) atomic model chemical symbols and formulae for elements and compounds chemical reactions are the rearrangement of atoms the varying physical and chemical properties of different elements Mendeleev periodic table the periodic table: periods and groups; metals and non-metals the properties of metals and non-metals the chemical properties of metal and non-metal oxides with respect to acidity. **Understanding:** Differences between atoms, elements and compounds represent chemical reactions using formulae and using equations the principles underpinning the how patterns in reactions can be predicted with reference to the periodic table **Skills:** 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. **Literacy & Communication skills:** The use of sentences to explain ideas clearly. **Maths skills**: Identify anomalous results (outliers) identify ranges use a variety of charts and graphs to present and analyse data.	Know some common elements and their symbols; including the groups: alkali metals halogens, (transition metals), noble gases. How are they are arranged in the periodic table? Be able to describe an element and a compound. State some physical and chemical properties with their trends, of elements in the above groups. Know when a chemical reaction has taken place. Use word equations for chemical reactions. Write simple chemical formulae to identify the types of and ratio of atoms in a compound. Explain how Mendeleev made predictions using his table. Describe the reactions of metals and non-metals with oxygen and metals with water, then compare the physical and chemical properties. Identify a pattern of reactivity in the reaction between some alkali metals and water and use this to predict the reactivity of other alkali metals.	**This will build on previous learning from:** 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) 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 (7H) Use the particle model to explain other observations about matter (7G) Describe elements, mixtures and compounds using words and particle diagrams (7H) Use chemical symbols for common elements and explain why they are an international code (7H) Describe and identify metals and non-metals by their properties (7H) Describe the changes you might see when compounds are formed (7H) Name simple compounds and use word equations to describe chemical reactions (7H).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Chemistry – 8G Metals & their Uses				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Metal Properties **Corrosion** **Metals and Water** **Metals and Acid** **Pure Metals and Alloys**	**Knowledge:** Recall chemical symbols and formulae for elements and compounds What a pure substance is Different mixtures, including dissolving 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. **Understanding:** Represent chemical reactions using formulae and using equations Identify pure substances Combustion, thermal decomposition, oxidation and displacement reactions **Skills Working Scientifically:** Make and record observations and measurements using a range of methods for different investigations; Evaluate the reliability of methods and suggest possible improvements. **Literacy & Communication skills:** The use of adjectives to accurately describe substances in science. **Maths:** Calculating mean values and percentages Drawing and interpreting bar charts and line graphs.	Describe some common properties of elements and link them to their uses. Recognise reactions can happen at different rates and catalysts can speed them up. Name the compounds formed by a reaction between a metal and a non-metal. Write word and simple symbol equations to describe reactions and identify the reactants and products Describe the reactions of different metals with oxygen and how this can be prevented Describe the reactions of metals with water and acids and name the products made Use information on the reactions of metals to place them in an order of reactivity. Recognise that pure substances have precise melting points and impure substances do not and identify a pure substance from its melting point	**This will build on previous learning from:** 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) 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 (7H) Use the particle model to explain other observations about matter (7G) Describe elements, mixtures and compounds using words and particle diagrams (7H) Use chemical symbols for common elements (7H) Describe and identify metals and non-metals by their properties (7H) Describe the changes you might see when compounds are formed (7H) Name simple compounds and use word equations to describe chemical reactions (7H).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Chemistry – 8H Rocks				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Rocks & Their Uses **Igneous and Metamorphic** **Weathering and Erosion** **Sedimentary Rocks** **Materials in the Earth**	**Knowledge:** The names of the three types of rock and examples of each. To be able to describe the rock cycle including how rocks form. **Understanding:** To be able to justify crystal size in igneous rocks as linked to temperature. To be able to justify how erosion can occur by physical, chemical and biological means. **Skills:** To be able use models to show how rocks form. To be able to interpret data on ratios and the rate of erosion along with forming opinions about living close to volcanos.	Know the composition and structure of the Earth Know the rock cycle and the formation of igneous, sedimentary, and metamorphic rocks Know Earth as a source of limited resources and the efficacy of recycling. **Working Scientifically:** Know how the scientific method is adapted for mainly observational sciences, such as geology. **Literacy & Communication skills** Analyse the use of emotive language and evaluating media reports. **Maths skills:** Interpret more complex graphs	**This will build on previous learning from:** From KS2 students will be able to: Compare and group together different kinds of rocks based on their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are trapped within rock. From previous units, most students will be able to: Describe elements, compounds and mixtures, chemical and physical changes (7H).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Physics – 8I Fluids				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
The Particle Model **Changing State** **Pressure in Fluids** **Floating & Sinking** **Drag**	**Knowledge:** State what is meant by expansion, contraction, density, latent heat, weight, upthrust, volume, displacement, pressure, steam, names of state changes, names of frictional forces. State common units of density, pressure, temperature, force. Recall factors affecting density. Recall that ice is less dense than water. Describe energy changes in a substance during changes of state and takes place at a constant temperature. Latent heat as the energy change associated with a state change. Pressure acts in all directions in fluids; increases with depth; some effects of atmospheric pressure. Recall drag changes with speed and examples where it is useful for drag to be reduced or increased **Understanding:** Use the kinetic theory to explain expansion/contraction; describe how volume and density changes in expansion/ contraction and in changes of state; describe how the expansion of water is anomalous; calculate density using the formula (r or) D=m/V Describe the difference between melting and boiling points of pure substances and mixtures. Use heating and cooling curves to determine the melting/freezing and boiling/condensation points of a pure substance. Explain the concept of latent heat in terms of the effect of adding energy to a substance using the kinetic theory. Explain pressure in fluids using the particle model. Explain: why fluid pressure increases with depth; some effects of air pressure and water pressure. Use the equation linking pressure in liquids with depth and density. Explain why objects float in terms of the factors affecting upthrust and the weight of fluid displaced and predict if objects will float or sink in water. Describe the causes of	Forces: associated 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	**This will build on previous learning:** From KS2 most students will: classify substances as solids, liquids or gases observe and name changes of state; identify the effects of air resistance and water resistance. From Year 7 most students will: use the particle model to explain the properties of solids, liquids and gases (7G) Understand how particles in a gas cause pressure (7G) Identify differences between chemical and physical changes (7H) Describe the effects of balanced and	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

	drag in terms of friction and how and why drag changes with speed. Explain how the resultant force on an object can change with speed. Explain why a vehicle needs a force from its engine to keep it moving at a constant speed and how drag forces can be increased or decreased and why we would want to do so. Use and interpret the equation linking drag, density, speed and frontal area to explain why vehicles have a top speed and why falling objects have a terminal velocity **Skills: Literacy & Communication skills**: Use of prepositional phrases. **Numeracy and Mathematical skills:** Apply mathematical concepts and calculate results.	temperature in motion and spacing of particles. Italicised topics are not explicitly taught in this unit	unbalanced forces on objects (7K).	

Physics – 8J Light				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Light on the Move **Reflection** **Refraction** **Cameras and Eyes** **Colour**	**Knowledge:** Reflection, scattering, transmission, absorption light traveling sources of light symbols and conventions in science total internal reflection focal length and lenses light moving through materials parts of a camera parts of the human eye filters coloured light **Understanding:** How mirrors work how to draw ray diagrams how shadows form interpreting documents/diagrams using scientific conventions the law of reflection the application of mirrors in different fields the relationship between lens shape and focal length how material density contributes to refraction how an image is created comparing cameras and eyes how does an object appear to have a particular colour how does a rainbow form **Skills:** How to measure angles how to setup and take accurate measurements from laboratory apparatus how to draw and interpret graphs how to follow a methodology how to stay safe in a laboratory environment how information can be presented in different ways to communicate scientific ideas clearly. This includes understanding sentence construction in order to develop sentences that can be used as part of a fluid writing style that communicates information clearly how to prepare effective presentations	Students will be able to explain: 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; photosensitive 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. Working Scientifically - the use of conventions in scientific communication	**This will build on previous learning from:** From KS2 most students will be able to: 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).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Physics – 8K Energy Transfers				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Temperature Changes **Transferring Energy** **Controlling Transfers** **Power and Efficiency** **Paying for Energy**	**Knowledge:** Absolute zero • units of Kelvin and Celsius • evaporation • radiation, convection, conduction • insulation • specific heat capacity • power (Watts and Joules per second) • Sankey diagrams • efficiency • energy bills • domestic appliances **Understanding:** How temperature of an object is defined by energy, material and mass • how to determine the flow of energy from one object to another • the conditions under which thermal transfer occurs • how to identify useful and wasted energy • how to apply the relationship between power, time and energy • why some appliances cost more to run than others • the concept of a kWh **Skills:** Substituting values in simple formulae and solving resulting equations • understanding percentage • drawing and interpreting scale drawings • choosing and using a suitable level of accuracy for measurements • how to setup and take accurate measurements from laboratory apparatus • how to draw and interpret graphs • how to follow a methodology • how to stay safe in a laboratory environment • how information can be presented in different ways to communicate scientific ideas clearly. This includes understanding sentence construction in order to develop sentences that can be used as part of a fluid writing style that communicates information clearly • using language appropriate to the audience	Students will be able to explain: how to compare power ratings of appliances in watts (W, kW) comparing amounts of energy transferred (J, kJ, kWh) domestic fuel bills, fuel use and costs heating and thermal equilibrium: temperature difference between two objects leading to energy 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 temperatures using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes. Working Scientifically objectivity and concern for accuracy, precision, repeatability and reproducibility	**This will build on previous learning from KS3:** From previous units, most students will be able to: use the particle model of matter to explain the properties of solids, liquids and gases (7G) Recall some ways in which energy is transferred and stored (7I) Recall the law of conservation of energy, and that the efficiency of a machine tells us how much energy is transferred as wasted energy (7I).	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**

Physics – 8L Earth & Space				
What are we learning?	**What knowledge, understanding and skills will we gain?**	**What does mastery look like?**	**How does this build on prior learning?**	**What additional resources are available?**
Changing Ideas/Gathering Evidence **Seasons** **Magnetic Earth** **Gravity in Space** **Beyond the Solar System** **Studying Space**	**Knowledge:** How observations of the solar system are made; models of the solar system; the seasons and their causes; magnetic fields of bar magnets and the Earth; calculating weight from mass and gravitational field strength; the role of gravity in space; stars and galaxies; distances involved in space. **Understanding:** How was our model of the solar system worked out? How can you make a good scientific argument? What causes the seasons? What is the Earth's magnetic field? How does gravity affect the solar system? How can we compare things numerically? What is beyond our solar system? **Skills:** **Mathematical skills:** making comparisons using ratios and percentages; converting fractions to decimals; substituting values into simple formulae and solving equations; drawing line and scatter graphs and drawing conclusions. **Literacy and Communication Skills:** Presenting Arguments	Understanding non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets Understanding behaviour of magnetic poles, attraction and repulsion Finding magnetic fields by plotting with compass, representation by field lines Describing Earth's magnetism, compass and navigation Explain 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) Describe our Sun as a star, other stars in our galaxy, other galaxies Explain the seasons and the Earth's tilt, day length at different times of year, in different hemispheres Understand the light year as a unit of astronomical distance.	**This will build on previous learning from:** From KS2, most students will be able to: • Describe the movement of the Earth and other planets relative to the Sun • Describe the movement of the Moon relative to the Earth • Describe the Sun, Earth and Moon as approximately spherical bodies • Use the idea of the Earth's rotation to explain day and night. From previous units, most students will be able to: • Describe the difference between weight and mass • Recall the direction in which gravity acts.	**Exploring Science 8 Textbook** **BBC Bitesize** **KS3 Revision Guide** **KS3 Knowledge Organiser and Retrieval Book**