Programme of study for KS3 Year 8

Autumn (1st term)	Autumn (2nd term)	Spring (1st term)	Spring (2nd Term)	Summer (1st term)	Summer (2nd term)
Topic / Big Question: ***Chemistry:*** The Periodic table, metals and their uses ***Chemistry:*** Combustion	Topic / Big Question: ***Biology:*** Ecosystems ***Biology:*** Plants and their reproduction ***Physics:*** Energy .	Topic / Big Question: ***Physics:*** Energy transfer ***Chemistry:*** Rocks	Topic / Big Question: ***Biology:*** Breathing and Respiration	Topic / Big Question: ***Physics:*** Current electricity	Topic / Big Question: ***Biology:*** Genetics and Evolution ***Physics:*** Light
Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.	Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.	Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.	Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.	Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.	Skills (students should be able to do): Demonstrate knowledge and understanding of: Scientific ideas, techniques and procedures through -Remembering key facts of any area within Science. -Using appropriate terminology in answers (key words and phrases). -Explaining the relationships between scientific advances, their ethical implications and the benefits and risks associated with them. Apply knowledge and understanding of: Scientific ideas, enquiry, techniques and procedures through -Applying knowledge effectively in a wide range of contexts.

-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.	-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.	-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.	-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.	-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.	-Using theories to make explanations of events. -Using data to support evidence. -Rearranging equations in calculations. Analyse information and ideas to: Interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures through -Evaluating information from a wide range of sources systematically to develop arguments and explanations. -Drawing detailed, evidence-based conclusions**.** **-**Spotting causes of error and uncertainty in data or experimental procedures. -Identifying the unit and/or symbol of different quantities. -The correct use of punctuation, spelling of key words, capital letters, sentences and paragraphs.
Key Learning Outcomes (students should know): ***Chemistry:*** The Periodic table, metals and their uses -Describe Dalton's atomic theory	Key Learning Outcomes (students should know): ***Biology:*** Ecosystems -Recall what a species is. -Describe variation as continuous or discontinuous.	Key Learning Outcomes (students should know): ***Physics:*** Energy transfer -Explain how internal energy and temperature are different.	Key Learning Outcomes (students should know): ***Biology:*** Breathing and Respiration -Recall what happens in aerobic respiration.	Key Learning Outcomes (students should know): ***Physics:*** Current electricity -Explain how switches work. -Describe what happens when the number of	Key Learning Outcomes (students should know): ***Biology:*** Genetics and Evolution -Identify different types of environmental variation and explain their causes.

-escribe elements using physical properties -Write and identify the chemical symbols for elements. -Explain the difference between physical and chemical changes and properties -Use atomic theory to explain what happens during chemical reactions. -Write and interpret chemical formulae -Use the periodic table to find elements with similar properties -Describe some typical properties of alkali metals. Halogens and noble gases -Describe how the periodic table is arranged. -Explain melting, freezing and boiling points and use them to predict the state of a substance. -Describe and identify trends in physical properties within the periodic table -Identify metals and non-metals by their	-Identify and describe some adaptations for different habitats. -Describe how inherited variation is caused. -Identify causes of environmental variation. -Describe adaptations to daily and seasonal changes. -Describe ways in which organisms affect their habitats and communities. -Describe how organisms compete. -Use a food web to make predictions. -Use pyramids of numbers to describe how energy is lost in a food chain. -Explain why pesticides need o be used carefully. ***Biology:*** Plants and their reproduction -Interpret scientific organism names. -Describe how organisms are classified. -Explain the importance of biodiversity.	-Identify the direction in which energy will be transferred. -Explain what happens to particles when a liquid evaporates. -Describe how energy is transferred by radiation, conduction and convection. -Use the particle model to explain energy transfers in matter. -Recall ways of reducing energy transfers. -Describe what power and efficiency mean. -Calculate efficiencies. -Interpret Sankey diagrams. -Explain how power companies charge for energy used. -Describe what a payback time tells you. -Work out payback times. ***Chemistry:*** Rocks -Describe the textures of some different rocks. Explain how some of the properties of rocks are related to their texture. -Recall some uses of rocks.	-Recall the functions of the organs in the gas exchange system. Explain how the structure of the lungs allows efficient gas exchange. -Describe the effects of exercise on breathing and heartbeat rates. -Describes how substances reach respiring cells from the blood and how waste products are returned to the blood. -Describe the causes, and explain the effects of, reduced oxygen supply on the body. -Recall ho9w to detect aerobic respiration. -Describe how gas exchange occurs in different organisms. -Recall what happens in anaerobic respiration. -Describe the effects of anaerobic respiration during and after hard exercise.	bulbs in a circuit is changed. -Describe what a current is and how it is measured. -Identify what parts of a physical model represent. -Use a physical model to help explain electric circuits. -State what is meant by current. -State what is meant by a series circuit and a parallel circuit. -Explain how switches can control different kinds of circuit. -Describe how changing the number or type of components in a circuit affects the current. -Describe the differences in how current behaves in series and parallel circuits. -Describe how changing the number or type of components in a circuit affects the current. Describe how a voltmeter is used. -Explain why the current increases when the	-Exaplin how environmental variation can cause problems with classification. -Identify different types of inherited variation -Explain how sexual reproduction causes inherited variation. -Outline how the structure of DNA was discovered. -Explain the importance of DNA -Describe the relationship between chromosomes, DNA, genes, genetic information and nuclei. -Explain how organisms become endangered or extinct. -Explain how adaptations affect the survival of organisms. -Explain some ways of preserving biodiversity. -Recall that individuals in a population vary genetically. -Explain how natural selection works on these variations. ***Physics:*** Light

properties and position in the periodic table. -Describe the reactions of some elements with water and oxygen. -Identify trends and make predictions about chemical properties using the periodic table. -Describe some common properties and uses of metals. -Write word equations for the reactions of metals and non-metals. -Describe what a catalyst is and some uses of catalysts. -Describe what happens during corrosion and rusting. -Explain how metals can be protected from corrosion. -Identify the products and reactants using a symbol equation. -Describe the reactions of metals with water -Place metals in order of reactivity -Write word and symbol equations for reactions. -Describe the reactions of metals with acids. -Place metals in order of reactivity.	-Recall the differences between sexual and asexual reproduction. -Recall examples of asexual reproduction in plants. -Explain characteristics of offspring produced by sexual and asexual reproduction. -Explain how the structures of flowers and pollen allow pollination, by animals or wind. -Explain how plants ensure cross-pollination. -Describe how pollination leads to fertilisation. -Describe the formation of seeds and fruits. -Explain the functions of seeds and fruits. -Describe what happens in germination. -Explain why seeds and plants need certain resources. -Describe how organisms are interdependent. ***Physics:*** Energy	-Describe the structure of the Earth. -Describe how igneous and metamorphic rocks are formed. -Explain how the grain size is evidence for the speed of cooling. -Describe how weathering can break up rocks. -Describe how weathered rocks are eroded. -Describe how sedimentary rocks are formed. -Describe the texture of some sedimentary rocks. -Use the rock cycle to link the three types of rock. -Describe how metals are obtained. -Describe some advantages of recycling metals.		voltage of the supply is increased. -Describe the relationship between resistance and current. -Explain some safety precautions to be followed when using electricity. -Describe the job that fuses and circuit breakers do. -Explain how a fuse works. -Recall how different wires are connected in a plug.	-Compare light and sound waves -Describe what happens to light when it hits different surfaces. -Describe how to demonstrate that light travels in straight lines. -Use the correct names for rays reaching and leaving a mirror and the angles between them and the normal. -Use ray tracing to investigate mirrors. -Describe how mirrors and rough surfaces reflect light. -Describe how an image is formed in a mirror using a ray diagram. -Recall some uses of lenses -Describe how light changes direction at the interface of two different substances. -Recall the parts of cameras and eyes and state their functions. -Describe some ways in which the energy transferred by light leads to chemical or electrical effects. -Describe how to make a spectrum

-Explain what alloys are and why they are used. -Use models to explain the properties of alloys. -Identify pure substances by their melting points and boiling points. ***Chemistry:*** Combustion -Describe the reactions of hydrogen and hydrocarbons with oxygen. -Use word equations to model combustion reactions. -Describe oxidation reactions of metals and non-metals. -Explain changes in mass seen in oxidation reactions. -Use the fire triangle to explain how to control a fire. -Identify hazard symbols for substances likely to cause fires. -Describe pollutants that are formed by burning fuels. -Explain how these pollutants cause problems and how their effects can be reduced.	-Recall that our bodies need energy, which we get from food. -Explain why different people need different amounts of energy from food. -Recall the units for measuring energy are joules(J) or kilojoules(kJ). 1kJ=1000J -Describe the different ways in which energy is transferred. -Describe different ways in which energy is stored. -Recall the law of conservation of energy. -Describe what fossil fuels are and how they were made. -Explain why fossil fuels are described as non-renewable. -Name some renewable fuels. -Give some examples of renewable energy resources. -Explain how the sun is the original source of energy for most of our energy resources. -Recall which energy resources do not depend on the Sun.				-Explain why coloured objects appear coloured.

-Describe the greenhouse effect and how it is caused. -Explain how human activity may be causing global warming.	-Describe advantages and disadvantages of different energy resources. -Describe some ways of using less fossil fuel. -Explain what efficiency means.				
Autumn Term – centrally planned, standardised and teacher marked piece(s) of work - Assessed home learning – Periodic table - Linear assessment		Spring Term – centrally planned, standardised and teacher marked piece(s) of work - Assessed home learning – Energy - Assessed home learning – Exercise - Linear assessment		Summer Term – centrally planned, standardised and teacher marked piece(s) of work - Assessed home learning – Rock cycle - Assessed home learning – Variation - End of year Linear assessment	

Building understanding: Rationale / breakdown for your sequence of lessons:

Chemistry:
Building on from what pupils have studies in year 7 about elements we now focus on the development of the periodic table and the way in which it is split up into different groups. Pupils will then look at the key characteristics of elements within each different group. Pupils will not have come across any of this at KS2. The next topic is metals and non- metals as they had not covered this in year 7. As students will have been introduced to atoms when discussing elements, pupils will then move onto identifying metals and non-metals based on position in periodic table and through an investigative task on their properties. Some of these metals are found in their native state i.e. gold whist some may be found as ores. As these substances can be found on Earth naturally, this links onto the previous topic of the periodic table.

The topic following on is combustion where AT ks2 students would have introduced to what a fuel was. This is built on and students will look at how we burn these fuels and what is produced. This links into pollutants in our atmosphere which leads into the topic of rocks which includes the Earth's atmosphere where pupils will look at what gases and elements we have present in our atmosphere and on Earth. This links in as we will be looking at the elements on the periodic table, some of which are found naturally on Earth, whilst others combine in the atmosphere to form gases. This also links into the Biology topic of respiration and photosynthesis which is taught during the same term allowing pupils to make linkages between plants providing oxygen for respiration and humans providing carbon dioxide for photosynthesis.

Biology:
At KS2 pupils will have been introduced to the classification system and are aware of the terms invertebrate and vertebrate. They will have been shown a food chain and taught how to interpret them and at KS3 pupils will taught how to construct their own Food chains, Food webs and how any disruption will affect these chains. As producers are part of food chains and are plants this leads into the next topic of plant reproduction. This leads on from year 7 where stidents have been introduced to animal reproduction. Within this photosynthesis and respiration are touched on as they are part of the life processes. This then leads

onto the respiratory system. At KS2 pupils will understand the term breathing and that it involves the lungs. They will also understand that breathing rate increases when we exercise due to increase need for oxygen. At KS3 we make the link between oxygen being needed for our cells and introduce the term respiration. Students will be taught the difference between breathing and respiration as these terms are often confused for the same thing. Breathing is taking in air to our lungs whist respiration is how we make energy and this occurs in the mitochondria which links back to the year 7 topic of cell where pupils will have come across the term. As plants also respire we introduce by introducing the process of photosynthesis. At KS2 pupils will not have come across this and will have only studied parts of a flowering plant. We then conclude with the topic of Genetics and Evolution which pupils have encountered at KS2. Pupils will be familiar with Charles Darwin, Darwin's Finches, fossils and Natural selection. At key stage 3 we build on this by looking more at the genetics side of inheritance in terms of genetic diagrams and how traits are passed on. This in turn links in with what pupils have covered in year 7 during reproduction where the sperm carried father's genetics and egg carries mother's genetics.

Physics:
Building on from KS2 and year 7 that all that plants need sunlight to grow and that animal, including humans, need food, Energy is the first topic. At KS3 we introduce pupils to different forms of energy and also investigate how energy can be released from food. Pupils will not have come across this at KS2.
We then move onto heating and cooling which pupils will have come across at KS2. They will be familiar with the term insulator and will have looked at methods we use to keep things cold and warm. At KS3 we build on this basic knowledge and focus on conduction, convection, radiation and insulation.
This is followed by Current and Electricity. Pupils will have come across this unit at KS2. Pupils will have been introduced to the basic components within circuits and can construct and draw simple series circuit diagrams. At KS3, this is built on by introducing pupils to parallel circuits, ammeters and voltmeters. This in turn allows pupils to measure current and voltage within series and parallel circuits which allows for pupils to further developing investigative skills by making observations and comparisons of these two types of circuits. We conclude with Light which follows on from sound and space in year 7. At KS2 pupils will have been introduced to light travelling in straight lines and to the term reflection. We build on this by investigating reflection and refraction.

Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.	Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.	Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.	Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.	Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.	Home – Learning: In addition to students being given the centrally planned home learning tasks as stated above teachers to set their own home learning from the resources provided in the topic folder.
Reading / High Quality Text:					

Students are provided with links to resources to encourage prior reading on topics. In lessons students are taught how to construct answers through use of writing frames and exemplar answers where extended writing is required and command words and keywords that are relevant to the topic are consistently assessed in lessons through questioning and exam practice. Spelling tests are conducted on key scientific terms. Example of how to use these scientific terms also taught.
Assessed tasks are included within topics where students are expected to write an extended piece of work.

Numeracy:

Physics:
Reading Ammeters, voltmeters
Calculating current
Manipulation of speed equation triangle
Understanding units
Conversion of units
presenting data graphically.

Chemistry:
Atomic number and mass number of elements
Proton, electron and neutron number of elements and compounds
Balancing chemical equations
Using measuring cylinders to accurately measure out solutions
Understanding ion charges
Understanding units
Conversion of units

Biology:
Balancing photosynthesis and Respiration symbol equation
Genetic diagram percentages

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):

- Science club
- Trip to Science Museum
- Trip to National History Museum
- Science week outside speakers