

Programme of study for KS3 Year 8

Autumn (1 st term)	Autumn (2 nd term)	Spring (1 st term)	Spring (2 nd Term)	Summer (1 st term)	Summer (2 nd term)
<p>Topic: Chemistry: Periodic table and elements</p> <p>Biology: Digestion</p>	<p>Topic: Physics: Potential difference and Current</p> <p>Chemistry: Earth and atmosphere</p>	<p>Topic: Biology: Breathing and Respiration</p> <p>Physics: Energy</p> <p>Chemistry: Type of reaction and Chemical reactions</p>	<p>Topic: Biology: Photosynthesis</p> <p>Chemistry: Type of reaction and Chemical reactions</p> <p>Physics: Work, Heating and Cooling</p>	<p>Topic: Physics: Work, Heating and Cooling</p> <p>Revision Chemistry: Type of reaction and Chemical reactions</p>	<p>Topic: Biology: Evolution and Inheritance</p>

Skills(students should be able to do):

AO1:

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.

AO2:

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.

AO3:

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.

<p>Key Learning Outcomes (students should know):</p> <p>Chemistry: Periodic table and elements</p> <ul style="list-style-type: none">•State what an element is•Identify chemical symbol of different elements•Use observations from experiments to explain why a substance must be an element•State what an atom is•Represent atoms using particle diagrams•Represent atoms using particle diagrams•State what a compound is•Represent molecules, elements, mixtures, and compounds using particle diagrams•Use particle diagrams to classify a substance as an element, mixture, or compound, and as molecules or atoms	<p>Key Learning Outcomes (students should know):</p> <p>Physics: Potential difference and current</p> <ul style="list-style-type: none">•Explain what potential difference is•Draw circuit diagrams and make circuits that measure potential difference•Explain how potential difference affects the way components work•Use a formula to calculate resistance•Make circuits and describe what components with resistance do•Describe the potential difference across components in series and parallel circuits•Make series and parallel circuits from circuit diagrams•Describe what is meant by current•Describe what happens to current in series and parallel circuits	<p>Key Learning Outcomes (students should know):</p> <p>Physics: Energy</p> <ul style="list-style-type: none">•State the unit of energy content in food•Compare the energy values of food and fuels•Compare the energy in foods and fuels with the energy needed for different activities•Describe the energy resources used to generate electricity•Explain the advantages and disadvantages of different energy resources•Describe how energy is transferred from an energy resource to an electrical device in the home•Describe what you pay for when you pay your electricity bill•Calculate the cost for home energy usage•Compare the energy usage and cost of running different home devices•Use a model of energy transfer between stores to	<p>Key Learning Outcomes (students should know):</p> <p>Biology: Breathing, Respiration and Photosynthesis</p> <ul style="list-style-type: none">•Recall how plants make glucose•Describe how plants get the resources they need for photosynthesis•Use the word equation to describe photosynthesis•Describe the structure and function of the main components of a leaf•Explain how a leaf is adapted for photosynthesis•State the factors that affect the rate of photosynthesis•Describe how to test a leaf for starch•Show graphically how different factors affect the rate of photosynthesis•State what fertilisers are used for•Describe how a plant uses minerals for healthy growth	<p>Key Learning Outcomes (students should know):</p> <p>Physics: Work, Heating and Cooling</p> <ul style="list-style-type: none">•Describe how energy is transferred by particles•Sketch diagrams to show convection currents•Describe how a thermal insulator can reduce energy transfer•Describe some sources of infrared radiation•Describe how energy is transferred from the sun to the Earth•Compare insulation methods in terms of conduction, convection, and radiation.	<p>Key Learning Outcomes (students should know):</p> <p>Biology: Evolution and Inheritance</p> <ul style="list-style-type: none">•State some factors that may lead to extinction•Describe the importance of biodiversity in maintaining plant and animal populations•Explain why a species has become extinct•Explain how a lack of biodiversity can affect an ecosystem•Describe what is meant by an endangered species•Describe some techniques used to prevent extinction•Describe how preserving biodiversity benefits humans.•Describe how characteristics are inherited•Describe the relationship between DNA, genes, and chromosomes
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<ul style="list-style-type: none"> •Name compounds using their chemical formulae •Draw simple ionic bond between group 1 and group 7 •Draw simple covalent bond between chlorine •Calculate Relative atomic mass •Calculate relative molecular mass •State what groups and periods of the periodic table tell you about the elements •Use data to describe a trend in physical properties •State the properties and reactivity of the group 1 elements •Use data and observations to describe trends and predict properties of Group 1 elements •Describe the reactions of any Group 1 element •State the properties and reactivity of the group 7 elements •Use data and observations to describe trends and predict properties of Group 7 elements 	<ul style="list-style-type: none"> •Describe what happens to current when you change components in a circuit •Describe the properties of an electric field •State how charged objects interact •Describe what happens when charged objects are placed near to each other <p>Chemistry: Earth and atmosphere</p> <ul style="list-style-type: none"> •Name the three rock layers of the Earth •Compare the layers of the Earth •Describe how sedimentary rocks are formed •Explain why a sedimentary rock has a particular property based on how it was formed •Describe how igneous and metamorphic rocks are formed •Explain why igneous and metamorphic rocks have particular properties based on how they were formed •Construct a labelled diagram to explain the process of rock formation 	<p>describe how jobs get done</p> <ul style="list-style-type: none"> •Describe how the energy of an object depends on its speed, temperature, height, or whether it is stretched or compressed. •Describe what dissipation means •Calculate the useful energy and the amount dissipated, given values of input and output energy •Explain how energy is dissipated in a range of situations <p>Chemistry: Type of reaction and Chemical reactions</p> <ul style="list-style-type: none"> •State what is meant by conservation of mass •Write word equations from information about chemical reactions •Use particle diagrams to show what happens in a chemical reaction •State the energy transfers involved in combustion •Write word equations for combustion reactions •State what thermal decomposition is •Write word equations for decomposition reactions 	<ul style="list-style-type: none"> •Explain the role of nitrates in plant growth <p>Physics: Energy</p> <ul style="list-style-type: none"> •State the unit of energy content in food •Compare the energy values of food and fuels •Compare the energy in foods and fuels with the energy needed for different activities •Describe the energy resources used to generate electricity •Explain the advantages and disadvantages of different energy resources •Describe how energy is transferred from an energy resource to an electrical device in the home •Describe what you pay for when you pay your electricity bill •Calculate the cost for home energy usage •Compare the energy usage and cost of running different home devices •Use a model of energy transfer between stores to describe how jobs get done •Describe how the energy of an object depends on 	<p>Biology: Evolution and Inheritance</p> <ul style="list-style-type: none"> •Describe the theory of natural selection •Explain why species evolve over time •Describe the process of peer review •Evaluate evidence that Darwin used to develop his theory of natural selection 	<ul style="list-style-type: none"> •Explain how DNA mutation may affect an organism and its future offspring •Describe the structure of DNA •Describe how scientists worked together to discover the structure of DNA •Describe the difference between dominant and recessive alleles •Use a punnett square to show how genes are inherited •Explain why offspring are not identical to their parents •Describe how a product is produced using genetic modification •Describe some advantages of genetic modification <p>Physics: Magnetism, Electromagnets and Waves</p> <ul style="list-style-type: none"> •Describe how sound transfers energy •Describe the link between amplitude or frequency and energy
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<ul style="list-style-type: none"> • Describe the reactions of any group 7 element • State the properties and reactivity of the Group 0 elements • Use data and observations to describe trends and predict properties of Group 0 elements • Describe the reactions of any group 0 element <p>Biology: Digestion</p> <ul style="list-style-type: none"> • Describe the components of a healthy diet and their functions in the body • Compare the nutritional content of different foods or diets • Describe the effects of deficiencies or excesses of different nutrients on a person's health • Describe how to test for starch, lipids, sugars, and protein • Describe the positive result for each food test. • Recall how you get and use energy • Describe some health issues caused by an unbalanced diet 	<ul style="list-style-type: none"> • Describe the properties of ceramics • Explain why a substance has a particular property based on how it was formed <p>Biology: Breathing, Respiration and Photosynthesis</p> <ul style="list-style-type: none"> • Describe the function of the gas exchange system • Explain how parts of the gas exchange system are adapted to their function • Explain why your breathing rate and volume can change • Describe the process of inhaling and exhaling • Explain what happens during breathing using the bell-jar model • Explain how exercise, smoking, and asthma affect the gas exchange system. • State what happens during aerobic respiration • Use a word equation to describe aerobic respiration 	<ul style="list-style-type: none"> • Explain observations about mass in a chemical or physical change • Calculate masses of reactants and products • Balance symbol equations • Describe exothermic and endothermic changes • Use experimental observations to distinguish exothermic and endothermic reactions • Identify whether an energy level diagram is showing an exothermic or endothermic reaction • State what happens to chemical bonds during exothermic and endothermic reactions • Use ideas about bond energies to explain energy changes in chemical reactions 	<p>its speed, temperature, height, or whether it is stretched or compressed.</p> <ul style="list-style-type: none"> • Describe what dissipation means • Calculate the useful energy and the amount dissipated, given values of input and output energy • Explain how energy is dissipated in a range of situations <p>Physics: Work, Heating and Cooling</p> <ul style="list-style-type: none"> • Describe what work is • Describe what simple machines do • Use a diagram to show how a lever works • Compare work needed to move different objects • State the difference between energy and temperature • State what the thermal energy of an object depends on • Explain, in terms of energy, why objects change temperature 		<ul style="list-style-type: none"> • Explain how a microphone and loudspeaker work • Describe the electromagnetic spectrum • Explain the effect of radiation on living cells • Explain in terms of frequency, the difference in damage done by electromagnetic waves • Compare transverse and longitudinal waves <p>Use wave models to explain observations of wave behaviour</p> <ul style="list-style-type: none"> • Describe what happens when waves superimpose
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<ul style="list-style-type: none">• State what happens during digestion• Describe the structure of the main parts of the digestive system• Describe how components of the digestive system are adapted to their function• Describe the role of enzymes in digestion• Describe the role of bacteria in digestion• Describe all the events that take place in turning a meal into simple food molecules.• State the difference between medicinal and recreational drugs• Describe the effects of drugs on health and behaviour• State what kind of drug ethanol is• Describe the effect of alcohol on health and behaviour• Describe the effect alcohol has on conception and pregnancy• Describe the effects of tobacco smoke on your health	<ul style="list-style-type: none">• State the difference between aerobic and anaerobic respiration• Use a word equation to describe anaerobic respiration• Explain why specific activities involve aerobic or anaerobic respiration• State the word equation for photosynthesis• Describe how bread, beer, and wine are made.				
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<p>•Explain the effects of tobacco smoke on health</p>						
<p>End of term 1 assessment to cover: Linear Progress Exam 1 All topics from year 7 AND Chemistry: Periodic table and Elements Biology: Digestion</p>		<p>End of term 2 assessment to cover: Linear Progress Exam 2 All topics from year 7, AND Chemistry: Periodic table and Elements, Earth and Atmosphere Biology: Digestion, Breathing, Respiration and Photosynthesis Physics: Potential difference, current, energy costs and energy transfers</p>		<p>End of year assessment to cover: End of Year Exam All topics from year 7, AND Chemistry: Periodic table and Elements, Earth and Atmosphere, Metals, non-metals, types of reaction and chemical reactions Biology: Digestion, Breathing, Respiration and Photosynthesis, Interdependence, Evolution and Inheritance Physics: Potential difference, current, energy costs and energy transfers, Work, Heating and Cooling</p>		

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

Biology:
During KS2 pupils have been introduced to the 7 key nutrients the body needs and through which parts food travel through in the digestive system. In year 8, knowledge is built on this by explaining why each key nutrient is needed for the body. The key parts of the digestive system is revisited with a focus on how each part performs a specific function within digestion. The term biological enzymes is introduced and enzymes associated with digestion are also introduced. This topic also links on from cells that was taught in year 7 and pupils are introduced to cells, tissues, organs and organ systems. The digestive system is one of the organ systems. 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. Due to changes within our KS3 curriculum, we will be looking at Interdependence with our current year 8 as we did not cover this in year 7. 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. We then conclude with the topic of Evolution and inheritance 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.

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 topic following on is 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. As we have made changes to the curriculum, 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 whilst 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. We conclude with type of reactions and chemical reactions as pupils will have been introduced to equations when look at Photosynthesis and respiration. At KS2 pupils will have also been taught about Chemical and Physical changes. At KS3 we look at why conservation of mass occurs within a reaction, and how reactions can release (exothermic) or take in (endothermic) energy to occur.

Physics:

Due to changes in our curriculum we will start with Electromagnets and then Energy as the current year 8 pupils were not taught this unit in year 7. 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 then move onto Energy which links on from circuits where pupils will have been introduced to chemical energy stored in batteries. 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. Our final topic in Physics is Magnetism and waves. Pupils have not come across this at KS2 it links on from radiation and previous topic on sound from year 7.

Home – Learning:

Centralised home learning tasks to support student understanding for each topic.

Reading / literacy:

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

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
- Crest club
- Trip to Science museum
- Trip to National History museum
- Science week outside speakers