



***“Somewhere, something incredible is waiting to be known.” Carl Sagan***

### **Science Curriculum - Intent:**

Our core purpose at The Beacon Centre for science is to deliver an engaging and challenging curriculum so that pupils develop a scientific perspective of the world around them and can make informed decisions. We aim to prepare our pupils effectively for the future to make them confident, responsible members of the school and wider community and to set them on the path to success for their future education. Following the National Curriculum as our progression model, we provide children with opportunities to better understand the world around them.



Our EYFS and KS1 scheme of work includes a wide range of scientific topics such as use of everyday materials, seasonal changes and living things and their habitats’ - these are based on the national curriculum of England. Our KS2 topics include a wide range of scientific topics such as Earth and space, human body systems, reversible and irreversible changes - all students follow a balanced curriculum that is also based on the national curriculum. As well as developing our students’ knowledge and understanding of scientific theory, our curriculum has an integrated ‘working scientifically’ component and a clear focus on scientific literacy and communication that seeks to develop students’ confidence in articulating their scientific ideas. Across both key stages all curriculum topics taught in science are linked to STEM learning – Science, Technology, English and Mathematics.

Children across KS3 and KS4 will be challenged to: analyse patterns, discuss limitations, draw conclusions, present data, communicate ideas, construct explanations, critique claims, justify opinions, collect data, devise questions, plan variables, test hypotheses, estimate risks, examine consequences, review theories, and interrogate sources.

In order for our children to achieve this, we as teachers will facilitate the students and have key vocabulary and scientific terminology to hand, in the form of visual classroom aids, on worksheets and reinforced throughout lessons. We will provide individual support which will assist our students in creating and building a scientifically accurate vocabulary. In addition we will ensure that there are equal opportunities which implement the use of literacy and numeracy through collecting, analysing and presenting data through experimental lessons.

## **Implementation:**

Throughout the key stages (primary and secondary) our science lessons harness our SEMH ethos and seek to encourage enquiry, tolerance and diversity. We capitalise on the wider learning teaching science brings including; Scientific literacy and communication covering a variety of skills, including taking and making notes, summarising information, presenting ideas, title writing, persuasive writing and arguments. It also covers the 'spoken language' component of the national curriculum. Numeracy is also promoted through data gathering/analysis and graph drawing. We encourage students to question data presented to them by identifying trends and anomalies. This provides opportunities for cross-curricular subjects to be taught fluently, developing prior knowledge to practise fundamental skills as well as promoting high standards and expectations in science enquiries.

We try to make learning relevant to the local area. For example, when studying the animals and their habitats we utilise our coast line to conduct practical experiments on sea creatures when rock pooling, or visit local farms and nature reserves. When we study the use of different materials we use trips to the glass factory, while using local buildings and structures such as the Tyne Bridge for inspiration when conducting strength tests. In terms of adaptation we think about how rural communities can work more locally rather than commuting and how we could prevent flooding on the River Tyne or create some technological solutions to some of the environmental issues facing young people in the future. Science is taught by topics as seen in LTP and each teacher will provide MTP's to accompany lessons taught personalised towards each pupils learning journey.

## **Impact:**

In order to measure the impact of science lessons taught we use a range of formative and summative assessment methods to monitor student progress. Each individual taught unit is assessed to allow teaching staff to offer effective and personalised intervention and ensure all students make the progress we feel they are capable of. This is recorded in books to ensure all topics are taught in depth and provide a visual learning tool to show pupils their own progress and encourage resilience in learning. At the beginning of each unit a cold assessment will be used to determine pupils' current knowledge and understanding of the topic that is being taught, this should be followed by a hot assessment (end of unit/topic) to monitor progression. Assessment trackers will subsequently inform planning and personalised approach towards each pupil making progress, these are available to see in the front of work books so progress is shared between staff and pupils, encouraging responsibility and autonomy in a child's learning. This makes it possible for everyone to be part of the pupils' learning.

## Long Term Plan

## Subject: Science

## Key Stage: KS1

| Key stage |                                                                                                                                               | Autumn 1                                                                                                                                                                              | Autumn 2                                                                                                                                                                                      | Spring 1                                                                                                                                                                                                        | Spring 2                                                                                                                                                                                                 | Summer 1                                                                                                                                                                                                                                                              | Summer 2                                                                                                                       |
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| Year 1    | <b>Title of Unit</b>                                                                                                                          | Every day materials                                                                                                                                                                   | Every day materials                                                                                                                                                                           | Plants                                                                                                                                                                                                          | Animals including humans                                                                                                                                                                                 | Animals including humans                                                                                                                                                                                                                                              | Seasonal changes                                                                                                               |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | Distinguish between an object and the material from which it is made<br><br>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock | Describe the simple physical properties of a variety of everyday materials<br><br>Compare and group together a variety of everyday materials on the basis of their simple physical properties | Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees<br><br>Identify and describe the basic structure of a variety of common flowering plants, including trees | Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals<br><br>Identify and name a variety of common animals that are carnivores, herbivores and omnivores | Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals including pets)<br><br>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense | Observe changes across the 4 seasons<br><br>Observe and describe weather associated with the seasons and how day length varies |
|           | <b><u>Assessment</u></b>                                                                                                                      | <b>Baseline assessment:</b><br>Every day materials baseline assessment<br><b>End of unit assessment:</b> Every day materials unit assessment                                          | <b>Baseline assessment:</b> Every day materials baseline assessment<br><b>End of unit assessment:</b> Every day materials unit assessment                                                     | <b>Baseline assessment:</b><br>Plants – baseline assessment<br><b>End of unit assessment:</b> Plants unit assessment                                                                                            | <b>Baseline assessment:</b><br>Animals including humans baseline<br><b>End of unit assessment:</b> Animals inc humans unit assessment                                                                    | <b>Baseline assessment:</b><br>Animals including humans baseline<br><b>End of unit assessment:</b> Animals inc humans unit assessment                                                                                                                                 | <b>Baseline assessment:</b><br>Seasonal changes<br><b>End of unit assessment:</b> Seasonal Changes unit assessment             |

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| Key stage |                                                                                                                                               | Autumn 1                                                                                                                                                             | Autumn 2                                                                                                                        | Spring 1                                                                                                                                                                       | Spring 2                                                                                                                                                                                                                                                                                                                 | Summer 1                                                                                                                                                                                                                                                                                                                                      | Summer 2                                                                                                                                                                                                                                                         |
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| Year 2    | <b>Title of Unit</b>                                                                                                                          | Uses of every day materials                                                                                                                                          | Uses of every day materials                                                                                                     | Plants                                                                                                                                                                         | Animals including humans                                                                                                                                                                                                                                                                                                 | Living things and their habitats                                                                                                                                                                                                                                                                                                              | Living things and their habitats                                                                                                                                                                                                                                 |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses | Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching | Observe and describe how seeds and bulbs grow into mature plants<br><br>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy | Notice that animals, including humans, have offspring which grow into adults<br><br>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air)<br><br>Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene | Explore and compare the differences between things that are living, dead, and things that have never been alive<br><br>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other | Identify and name a variety of plants and animals in their habitats, including microhabitats<br><br>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food |
|           | <b><u>Assessment</u></b>                                                                                                                      | <b>Baseline assessment:</b><br>Uses of materials baseline                                                                                                            | <b>Baseline assessment:</b><br>Uses of materials baseline                                                                       | <b>Baseline assessment:</b><br>Plants baseline assessment                                                                                                                      | <b>Baseline assessment:</b>                                                                                                                                                                                                                                                                                              | <b>Baseline assessment:</b>                                                                                                                                                                                                                                                                                                                   | <b>Baseline assessment:</b>                                                                                                                                                                                                                                      |

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|  |  | <b>End of unit assessment:</b><br>Uses of materials unit assessment | <b>End of unit assessment:</b><br>Uses of materials unit assessment | <b>End of unit assessment:</b><br>Plants unit assessment | Animals including humans baseline<br><b>End of unit assessment:</b><br>Animals inc humans unit assessment | Living things and their habitats baseline<br><b>End of unit assessment:</b><br>Living things and their habitats unit assessment | Living things and their habitats baseline<br><b>End of unit assessment:</b><br>Living things and their habitats unit assessment |
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## Long Term Plan

## Subject: Science

## Key Stage: KS2

| Key stage |                                                                                                                                               | Autumn 1                                                                                                                                                                                                                                                                                                 | Autumn 2                                                                                                                                                                                                                                                                                                                                      | Spring 1                                                                                                                                                                                                                                                                                | Spring 2                                                                                                                                                                                                                                                                                       | Summer 1                                                                                                                                                                                                                                                       | Summer 2                                                                                                                                                                                                                                                                    |
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| Year 3    | <b>Title of Unit</b>                                                                                                                          | Rocks                                                                                                                                                                                                                                                                                                    | Light                                                                                                                                                                                                                                                                                                                                         | Plants                                                                                                                                                                                                                                                                                  | Animals including humans                                                                                                                                                                                                                                                                       | Forces and Magnets                                                                                                                                                                                                                                             | Forces and Magnets                                                                                                                                                                                                                                                          |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | <p>Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</p> <p>Describe in simple terms how fossils are formed when things that have lived are trapped within rock</p> <p>Recognise that soils are made from rocks and organic matter</p> | <p>Recognise that they need light in order to see things and that dark is the absence of light</p> <p>Notice that light is reflected from surfaces</p> <p>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>Recognise that shadows are formed when the light from a light source is</p> | <p>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</p> <p>Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</p> | <p>Identify that animal, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</p> <p>Identify that human and some other animals have skeletons and muscles for support, protection and movement</p> | <p>Compare how things move on different surfaces</p> <p>Notice that some forces need contact between 2 objects, but magnetic forces can act at a distance</p> <p>Observe how magnets attract or repel each other and attract some materials and not others</p> | <p>Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials</p> <p>Describe magnets as having 2 poles</p> <p>Predict whether 2 magnets will attract or repel each other,</p> |

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|  |                          |                                                                                                                                | <p>blocked by an opaque object</p> <p>Find patterns in the way that the size of shadows changes</p>                              | <p>Investigate the way in which water is transported within plants</p> <p>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</p> |                                                                                                                                            |                                                                                                                                      | depending on which poles are facing                                                                                                  |
|  | <b><u>Assessment</u></b> | <p><b>Baseline assessment:</b><br/>Rock baseline assessment</p> <p><b>End of unit assessment:</b><br/>Rock unit assessment</p> | <p><b>Baseline assessment:</b><br/>Light baseline assessment</p> <p><b>End of unit assessment:</b><br/>Light unit assessment</p> | <p><b>Baseline assessment:</b><br/>Plants baseline assessment</p> <p><b>End of unit assessment:</b><br/>Plants end of unit assessment</p>                                                                        | <p><b>Baseline assessment:</b><br/>Animals including humans baseline</p> <p><b>End of unit assessment:</b><br/>Animals unit assessment</p> | <p><b>Baseline assessment:</b><br/>Forces and magnets baseline</p> <p><b>End of unit assessment:</b><br/>Forces and magnets unit</p> | <p><b>Baseline assessment:</b><br/>Forces and magnets baseline</p> <p><b>End of unit assessment:</b><br/>Forces and magnets unit</p> |

| Key stage |                      | Autumn 1         | Autumn 2 | Spring 1                         | Spring 2                 | Summer 1                 | Summer 2    |
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| Year 4    | <b>Title of Unit</b> | States of matter | Sound    | Living things and their habitats | Animals including humans | Animals including humans | Electricity |

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|  | <p><b>Non Negotiable end-points</b><br/>(these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</p> | <p>Compare and group materials together, according to whether they are solids, liquids or gases</p> <p>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</p> <p>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</p> | <p>Identify how sounds are made, associating some of them with something vibrating</p> <p>Recognise that vibrations from sounds travel through a medium to the ear</p> <p>Find patterns between the pitch of a sound and features of the object that produced it</p> <p>Find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>Recognise that sounds get fainter as the distance from the sound source increases</p> | <p>Recognise that living things can be grouped in a variety of ways</p> <p>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</p> <p>Recognise that environments can change and that this can sometimes pose dangers to living things</p> | <p>Describe the simple functions of the basic parts of the digestive system in humans</p> <p>Identify the different types of teeth in humans and their simple functions</p> | <p>Construct and interpret a variety of food chains, identifying producers, predators and prey</p>                                   | <p>Identify common appliances that run on electricity</p> <p>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery</p> <p>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>Recognise some common conductors and insulators, and associate metals with being good conductors</p> |
|  | <b><u>Assessment</u></b>                                                                                                                                 | <p><b>Baseline assessment:</b><br/>States of matter assessment</p> <p><b>End of unit assessment:</b><br/>States of matter unit assessment</p>                                                                                                                                                                                                                                                                       | <p><b>Baseline assessment:</b><br/>Sound baseline</p> <p><b>End of unit assessment:</b><br/>Sound unit assessment</p>                                                                                                                                                                                                                                                                                                                                                | <p><b>Baseline assessment:</b><br/>Living things and their habitats baseline</p> <p><b>End of unit assessment:</b><br/>Living things and</p>                                                                                                                                                                                | <p><b>Baseline assessment:</b><br/>Animals including humans baseline</p> <p><b>End of unit assessment:</b><br/>Animals including</p>                                        | <p><b>Baseline assessment:</b><br/>Animals including humans baseline</p> <p><b>End of unit assessment:</b><br/>Animals including</p> | <p><b>Baseline assessment:</b><br/>Electricity - baseline</p> <p><b>End of unit assessment:</b><br/>Electricity unit assessment</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

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|  |  |  |  | their habitats<br>unit assessment | humans unit<br>assessment | humans unit<br>assessment |  |
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| Key stage |                                                                                                                                               | Autumn 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Autumn 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Spring 1                                                                                                                                                                       | Spring 2                                          | Summer 1                                                                                                                                                                                                                                                                                                                                                              | Summer 2                                                                                                                                                                                                                                                                                                                                                                               |
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| Year 5    | <b>Title of Unit</b>                                                                                                                          | Properties and changes of materials                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Properties and changes of materials                                                                                                                                                                                                                                                                                                                                                                                                                                         | Living things and their habitats                                                                                                                                               | Animals including humans                          | Earth and Space                                                                                                                                                                                                                                                                                                                                                       | Forces                                                                                                                                                                                                                                                                                                                                                                                 |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | <p>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</p> <p>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</p> <p>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</p> | <p>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</p> <p>Demonstrate that dissolving, mixing and changes of state are reversible changes</p> <p>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</p> | <p>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</p> <p>Describe the life process of reproduction in some plants and animals</p> | Describe the changes as humans develop to old age | <p>Describe the movement of the Earth and other planets relative to the sun in the solar system</p> <p>Describe the movement of the moon relative to the Earth</p> <p>Describe the sun, Earth and moon as approximately spherical bodies</p> <p>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</p> | <p>Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect</p> |

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|  | <b><u>Assessment</u></b> | <b>Baseline assessment:</b><br>Properties and changes of materials baseline<br><b>End of unit assessment:</b><br>Properties and changes of materials unit assessment | <b>Baseline assessment:</b><br>Properties and changes of materials baseline<br><b>End of unit assessment:</b><br>Properties and changes of materials unit assessment | <b>Baseline assessment:</b><br>Living things and their habitats baseline<br><b>End of unit assessment:</b><br>Living things and their habitats unit assessment | <b>Baseline assessment:</b><br>Animals including humans - baseline<br><b>End of unit assessment:</b><br>Animals including humans unit assessment | <b>Baseline assessment:</b><br>Earth and Space - Baseline<br><b>End of unit assessment:</b><br>Earth and Space unit assessment | <b>Baseline assessment:</b><br>Forces – baseline<br><b>End of unit assessment:</b><br>Forces unit assessment |

| Key stage |                                                                                                                     | Autumn 1                                                                                                                                                             | Autumn 2                                                                                                                                                                                                                                 | Spring 1                                                                                                                                                                                            | Spring 2                                                                                                                                                                                                     | Summer 1                                                                                                                                                    | Summer 2                                                                                                                                                                                                            |
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| Year 6    | <b>Title of Unit</b>                                                                                                | Electricity                                                                                                                                                          | Light                                                                                                                                                                                                                                    | Living things and their habitats                                                                                                                                                                    | Animals including humans                                                                                                                                                                                     | Evolution and Inheritance                                                                                                                                   | Evolution and Inheritance                                                                                                                                                                                           |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need</b> | Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit<br><br>Compare and give reasons for variations | Recognise that light appears to travel in straight lines<br><br>Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye<br><br>Explain that we see things | Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals | Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood<br><br>Recognise the impact of diet, exercise, drugs and lifestyle on the | Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago | Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents<br><br>Identify how animals and plants are adapted to suit their environment in |

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|  | to include them all here) | <p>in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches</p> <p>Use recognised symbols when representing a simple circuit in a diagram</p> | <p>because light travels from light sources to our eyes or from light sources to objects and then to our eyes</p> <p>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</p> | Give reasons for classifying plants and animals based on specific                                                                                                           | <p>way their bodies function</p> <p>Describe the ways in which nutrients and water are transported within animals, including humans</p>                     |                                                                                                                                                                 | different ways and that adaptation may lead to evolution                                                                                                        |
|  | <b><u>Assessment</u></b>  | <p><b>Baseline assessment:</b><br/>Electricity baseline</p> <p><b>End of unit assessment:</b><br/>Electricity unit assessment</p>                                                                               | <p><b>Baseline assessment:</b><br/>Light baseline</p> <p><b>End of unit assessment:</b><br/>Light unit assessment</p>                                                                                                                               | <p><b>Baseline assessment:</b><br/>Living things and their habitats baseline</p> <p><b>End of unit assessment:</b><br/>Living things and their habitats unit assessment</p> | <p><b>Baseline assessment:</b><br/>Animals including humans baseline</p> <p><b>End of unit assessment:</b><br/>Animals including humans unit assessment</p> | <p><b>Baseline assessment:</b><br/>Evolution and inheritance - baseline</p> <p><b>End of unit assessment:</b><br/>Evolution and inheritance unit assessment</p> | <p><b>Baseline assessment:</b><br/>Evolution and inheritance - baseline</p> <p><b>End of unit assessment:</b><br/>Evolution and inheritance unit assessment</p> |

## Long Term Plan

## Subject: Science

## Key Stage: KS3

| Key stage 3 |                                                                                                                                               | Autumn 1                                                                                                                                                                                                                                                                                                                                                                                                                                              | Autumn 2                                                                                                                                                                                                                                                                                                                                                                                                                                                | Spring 1                                                                                                                                                                                                                                                                                                                                                                                      | Spring 2                                                                                                                                                                                                                                                                                                                                                               | Summer 1                                                                                                                                                                                                                                                                                                                                                             | Summer 2                                                                                                                                                                                                                                                                                                                                                                                                     |
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| Year 7/8    | <b>Title of Unit</b>                                                                                                                          | <b>Introduction to science</b> - Health and safety In laboratory setting<br><br><b>Forces</b> - Speed & gravity                                                                                                                                                                                                                                                                                                                                       | <b>Electromagnets</b> – voltage & resistance, and current<br><br><b>Energy</b> - energy costs & energy transfer                                                                                                                                                                                                                                                                                                                                         | <b>Waves</b> - sound and light<br><br><b>Matter</b> - particle model and separating mixtures                                                                                                                                                                                                                                                                                                  | <b>Reactions</b> - Metals and non-metals, Acids and alkalis<br><br><b>Earth</b> - earth structure and universe                                                                                                                                                                                                                                                         | <b>Organisms</b> - movement and cells<br><br><b>Ecosystem</b> - interdependence and plant production                                                                                                                                                                                                                                                                 | <b>Genes</b> - variation and human reproduction                                                                                                                                                                                                                                                                                                                                                              |
|             | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | <b>Speed:</b><br><b>"Investigate"</b> variables that affect the speed of a toy car rolling down a slope.<br><br><b>"know"</b> If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction.<br><br><b>Gravity:</b><br><b>"Explain"</b> the way in which an astronaut's weight varies on a journey to the moon<br><b>"Know"</b> Mass and weight are different but related. Mass is a | <b>Voltage &amp; resistance:</b><br><b>"Compare"</b> the voltage drop across resistors connected in series in a circuit<br><br><b>"Know"</b> We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance | <b>Sound</b><br><b>Relate</b> changes in the shape of an oscilloscope trace to changes in pitch and volume<br><br><b>Know</b> Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency (and therefore the shorter the | <b>Metals and non-metals</b><br><b>Use</b> experimental results to suggest an order of reactivity of various metals<br><br><b>Know</b> Metals and non-metals react with oxygen to form oxides which are either bases or acids. Metals can be arranged as a reactivity series in order of how readily they react with other substances. Some metals react with acids to | <b>Movement</b><br><b>Explore</b> how the skeletal system and muscular system in a chicken wing work together to cause movement<br><br><b>know</b> the parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Antagonistic pairs of muscles create movement when one contracts and the other relaxes. | <b>Variation</b><br><b>Graph</b> data relating to variation and explain how it may lead to the survival of a species<br><br><b>Know</b> there is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an |

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|  | <p>property of the object; weight depends upon mass but also on gravitational field strength. Every object exerts a gravitational force on every other object. The force increases with mass and decreases with distance. Gravity holds planets and moons in orbit around larger bodies.</p> | <p>reduce the current flowing and shift energy to the surroundings.</p> <p><b>Energy cost:</b><br/> <b>"Compare"</b> the running costs of fluorescent and filament light bulbs.<br/> <b>"Know"</b><br/>         We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages. Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh)</p> <p><b>Energy Transfer:</b><br/> <b>"Explain"</b> the energy transfers in a hand-crank torch.<br/> <b>"Know"</b><br/>         We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.</p> | <p>wavelength), the higher the pitch.</p> <p><b>Light</b><br/> <b>Use</b> ray diagrams to model how light passes through lenses and transparent materials</p> <p><b>know</b> When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear in different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model.</p> <p><b>Particle model</b><br/> <b>Relate</b> the features of the particle model to the properties of materials in different states</p> <p><b>know</b> properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Observations where substances change</p> | <p>produce salts and hydrogen.</p> <p><b>Acids and alkalis</b><br/> <b>Devise</b> an enquiry to compare how well indigestion remedies work<br/> <b>Know</b> The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called salt and water.</p> <p><b>Earth Structure</b><br/> <b>Model</b> the processes that are responsible for rock formation and link these to the rock features</p> <p><b>Know</b> sedimentary, igneous and metamorphic rocks can be interconverted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.</p> <p><b>Universe</b><br/> <b>Relate</b> observations of changing day length to an appropriate model of the solar system<br/> <b>Know</b> the solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Our solar system is a tiny part of a galaxy, one of many billions in the Universe.</p> | <p><b>Cells</b><br/> <b>Identify</b> the principal features of a cheek cell and describe their functions</p> <p><b>Know</b> multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. There are many types of cell. Each has a different structure or feature so it can do a specific job.</p> <p><b>Ecosystems</b><br/> <b>Use</b> a model to investigate the impact of changes in a population of one organism on others in the ecosystem</p> <p><b>know</b><br/>         Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients.</p> <p><b>Plant production</b><br/> <b>Use</b> models to evaluate the features of various types of seed dispersal</p> <p><b>know</b><br/>         Plants have adaptations to disperse seeds using wind, water or animals.</p> | <p>always changing environment.</p> <p><b>Human reproduction</b><br/> <b>Relate</b> advice to pregnant women to ideas about transfer of substances to the embryo</p> <p><b>Know</b> the menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.</p> |
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|                          |                                                                                                                                      |                                                                                                                                                                                                | <p>temperature or state can be described in terms of particles gaining or losing energy</p> <p><b>Separating mixtures</b><br/> <b>Devise</b> ways to separate mixtures, based on their properties<br/> <b>know</b> a pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</p> | <p>Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies.</p>                                                                                                                                                                  | <p>Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary.</p>                                                                                                                                                                |                                                                                                                                                                  |
| <b><u>Assessment</u></b> | <p><b>Baseline assessment: Forces-</b><br/>Speed &amp; gravity</p> <p><b>End of unit assessment: Forces-</b> Speed &amp; gravity</p> | <p><b>Baseline assessment: Electromagnets –</b><br/>voltage &amp; resistance, and current</p> <p><b>End of unit assessment: Electromagnets –</b><br/>voltage &amp; resistance, and current</p> | <p><b>Baseline assessment: Waves-</b><br/>sound and light<br/> <b>Matter-</b><br/>particle model and separating mixtures</p> <p><b>End of unit assessment: Waves-</b><br/>sound and light<br/> <b>Matter-</b><br/>particle model and separating mixtures</p>                                                                                                                                                                                                                                                                            | <p><b>Baseline assessment: Reactions-</b><br/>Metals and non-metals, Acids and alkalis</p> <p><b>Earth-</b><br/>earth structure and universe</p> <p><b>End of unit assessment: Reactions-</b><br/>Metals and non-metals, Acids and alkalis</p> <p><b>Earth-</b><br/>earth structure and universe</p> | <p><b>Baseline assessment: Organisms-</b> movement and cells</p> <p><b>Ecosystem-</b><br/>interdependence and plant production</p> <p><b>End of unit assessment: Organisms-</b> movement and cells</p> <p><b>Ecosystem-</b><br/>interdependence and plant production</p> | <p><b>Baseline assessment: Genes-</b><br/>variation and human reproduction</p> <p><b>End of unit assessment: Genes-</b><br/>variation and human reproduction</p> |

| Key stage |                                                                                                                                               | Autumn 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 3         | Title of Unit                                                                                                                                 | <b>Forces</b> - ( contact forces & pressure)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Electromagnets</b> - (electromagnets & magnetism)<br><b>Energy</b> - (work and heating & cooling)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <b>Waves</b> - wave effects and wave properties<br><b>Matter</b> - periodic table and elements                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Reactions</b> - Chemical energy, Types of reactions<br><b>Earth</b> - Climate change, earth resources                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>Organisms</b> - breathing and digestion<br><br><b>Ecosystems</b> - respiration and photosynthesis                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Genes</b> - evolution and inheritance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|           | <b>Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here)</b> | <p><b>Contact forces:</b><br/>"Investigate" factors that affect the size of frictional or drag forces<br/>"Know" When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied.</p> <p><b>Pressure:</b><br/>"Investigate" how pressure from your foot onto the ground varies with different footwear.<br/>"Know"<br/>Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust. Objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces.</p> | <p><b>electromagnets:</b><br/>"Investigate" ways of varying strength of an electromagnet<br/>"Know"an electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid.</p> <p><b>Magnetism:</b><br/><b>Explore</b> the magnetic field pattern around different types or combinations of magnets<br/><b>know</b><br/>Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences.</p> <p><b>Energy- work:</b><br/><b>Explain</b> how an electric motor raising a weight is doing work<br/><b>Know</b> work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. Machines make work easier by reducing the force</p> | <p><b>wave effect</b><br/>Relate the impact of different types of waves on living cells to their frequency and the energy carried by the wave</p> <p><b>Know</b> When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy</p> <p><b>wave properties</b><br/>Use the wave model to explain observations of the reflection, absorption and transmission of waves</p> <p><b>periodic table</b><br/><b>Sort</b> elements using chemical data and relate this to their position in the periodic table<br/><b>know</b> the elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties.</p> | <p><b>Chemical Energy</b><br/><b>Investigate</b> a phenomenon that relies on an exothermic or endothermic reaction</p> <p><b>Know</b>During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic.</p> <p><b>Types of Reactions</b><br/><b>Investigate</b> changes in mass for chemical and physical processes</p> <p><b>Know</b>Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.<br/><b>Climate</b></p> | <p><b>Breathing</b><br/><b>Investigate</b> a claim linking height to lung volume</p> <p><b>Know</b> that in gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required</p> <p><b>Digestion</b><br/><b>Evaluate</b> how well a model represents key features of the digestive system</p> <p><b>Know</b> that the body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.</p> | <p><b>Evolution</b><br/>Review the evidence for theories about how a particular species went extinct<br/><b>know</b> natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans</p> <p><b>Inheritance</b><br/><b>Model</b> the inheritance of a specific trait and explore the variation in the offspring produced</p> <p><b>know</b> inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of</p> |

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|  |  |  | <p>needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction.</p> <p><b>Heating &amp; cooling</b></p> <p><b>Investigate</b> how to prevent heat loss by conduction, convection and radiation</p> <p><b>Know</b> the thermal energy of an object depends upon its mass, temperature and what it's made of. When there is a temperature difference, energy transfers from the hotter to the cooler object. Thermal energy is transferred through different pathways, by particles in conduction and convection, and by radiation</p> |  | <p><b>Investigate</b> the contribution that natural and human chemical processes make to our carbon dioxide emissions</p> <p><b>Know</b> Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels). Greenhouse gases reduce the amount of energy lost from the Earth through radiation and therefore the temperature has been rising as the concentration of those gases has risen. Scientists have evidence that global warming caused by human activity is causing changes in climate.</p> <p><b>Earth Resources</b></p> <p><b>Predict</b> the method used for extracting metal based on its position in the reactivity series</p> <p><b>Know</b> There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources. Most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis</p> | <p><b>Respiration</b></p> <p><b>Use</b> data from investigating fermentation with yeast to explore respiration</p> <p><b>know</b> that respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable.</p> <p><b>Photosynthesis</b></p> <p><b>Use</b> lab tests on variegated leaves to show that chlorophyll is essential for photosynthesis</p> <p><b>Know</b> plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially-adapted organs that allow them to obtain resources needed for photosynthesis.</p> | <p>chromosomes of each parent, combine during fertilisation.</p> |
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|  |                   |                                                                                                                                                             |                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                     | is needed for more reactive metals.                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                         |                                                                                                                                     |
|  | <b>Assessment</b> | <b>Baseline assessment:</b><br><b>Forces</b> -( contact forces & pressure)<br><b>End of unit assessment:</b><br><b>Forces</b> -( contact forces & pressure) | <b>Baseline assessment:Electromagnets</b><br>-<br>(electromagnets & magnetism)<br><b>Energy-</b><br>(work and heating & cooling)<br><b>End of unit assessment:Electromagnets</b><br>-<br>(electromagnets & magnetism)<br><b>Energy-</b><br>(work and heating & cooling) | <b>Baseline assessment:Waves-</b><br>wave effects and wave properties<br><b>Matter-</b><br>periodic table and elements<br><b>End of unit assessment:Waves-</b><br>wave effects and wave properties<br><b>Matter-</b><br>periodic table and elements | <b>Baseline assessment:Reactions-</b><br>Chemical energy, Types of reactions<br><b>Earth-</b><br>Climate change, earth resources<br><b>End of unit assessment:Reactions-</b><br>Chemical energy, Types of reactions<br><b>Earth-</b><br>Climate change, earth resources | <b>Baseline assessment:Organisms-</b><br>breathing and digestion<br><b>Ecosystems-</b><br>respiration and photosynthesis<br><b>End of unit assessment:Organisms-</b><br>breathing and digestion<br><b>Ecosystems-</b><br>respiration and photosynthesis | <b>Baseline assessment:Genes-</b><br>evolution and inheritance<br><b>End of unit assessment:Genes-</b><br>evolution and inheritance |

## Long Term Plan

## Subject: Science

## Key Stage: KS4

| Key stage 4               |                                                                                               | Autumn 1                                                                                                                                                                                                                                                                                                          | Autumn 2                                                                                                                                                                                                                                                               | Spring 1                                                                                                                                                                                                                                           | Spring 2                                                                                                                                                                                                                              | Summer 1                                                                                                                                                                   | Summer 2                                                                                                                                                                                                                         |
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| Year 10 GCSE phase 1 of 2 | Title of unit                                                                                 | 4.1 Building blocks of science                                                                                                                                                                                                                                                                                    | 4.1 Building blocks of science<br>4.2 Transport over larger distances                                                                                                                                                                                                  | 4.2 Transport over larger distances                                                                                                                                                                                                                | 4.2 Transport over larger distances<br>4.3 interactions with the environment                                                                                                                                                          | 4.3 interactions with the environment                                                                                                                                      | 4.4 Explaining change                                                                                                                                                                                                            |
|                           | Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. | 4.1 Building blocks: from atoms to cells, behaviour and transport on the small scale.<br><b>Topic 1</b><br><b>chapter 1.1 building blocks</b> <ul style="list-style-type: none"> <li>states of matter</li> <li>density</li> <li>particle theory</li> <li>gas pressure</li> <li>heating/change of state</li> </ul> | 4.1 Building blocks: from atoms to cells, behaviour and transport on the small scale.<br><b>Topic 1</b><br><b>chapter 1.4 waves</b> <ul style="list-style-type: none"> <li>transferring energy and info by waves</li> <li>transverse and longitudinal waves</li> </ul> | 4.2 Transport over larger distances: systems in animals and plants and how these systems interact.<br><b>Topic 2</b><br><b>chapter 2.2 plants and photosynthesis</b> <ul style="list-style-type: none"> <li>system</li> <li>blood cells</li> </ul> | 4.2 Transport over larger distances: systems in animals and plants and how these systems interact.<br><b>Topic 2</b><br><b>chapter 2.2 plants and photosynthesis</b> <ul style="list-style-type: none"> <li>photosynthesis</li> </ul> | 4.3 Interactions with the environment: the effects of factors in the environment on organisms, how our choices affect our health.<br><b>chapter 3.2 radiation and risk</b> | 4.4 Explaining change: how organisms, species, living and non-living systems change over time.<br><b>Topic 4</b><br><b>chapter 4.1 earth's atmosphere</b> <ul style="list-style-type: none"> <li>the early atmosphere</li> </ul> |

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|  | <p><b>You don't need to include them all here)</b></p> | <ul style="list-style-type: none"> <li>• specific heat capacity</li> <li>• specific latent heat</li> <li>• meaning of purity</li> </ul> <p><b>chapter 1.2 atomic structure</b></p> <ul style="list-style-type: none"> <li>• atomic structure</li> <li>• scientific models of atoms</li> <li>• subatomic particles</li> <li>• orders of magnitude</li> <li>• isotopes</li> <li>• electrons in atoms</li> </ul> <p><b>Topic 1</b></p> <p><b>chapter 1.3 cells in animals and plants</b></p> <ul style="list-style-type: none"> <li>• electron microscopy</li> <li>• cell structures</li> <li>• required practical: observing cells under microscopes</li> <li>• diffusion in and out of cells</li> <li>• osmosis</li> <li>• active transport</li> <li>• mitosis</li> <li>• meiosis</li> <li>• cell differentiation</li> </ul> | <ul style="list-style-type: none"> <li>• measuring wave speed</li> <li>• required practical: measuring wavelength, speed, frequency</li> <li>• electromagnetic waves and uses</li> <li>• reflection and refraction</li> </ul> <p>4.2 Transport over larger distances: systems in animals and plants and how these systems interact.</p> <p><b>Topic 2</b></p> <p><b>chapter 2.1 systems in the human body</b></p> <ul style="list-style-type: none"> <li>• cellular respiration</li> <li>• comparing aerobic / anaerobic respiration</li> <li>• the need for transport systems in multicellular organisms</li> <li>• volume ratio/surface area</li> <li>• exchange surfaces</li> <li>• the human heart</li> <li>• human circulatory</li> </ul> | <ul style="list-style-type: none"> <li>• human digestive system</li> <li>• required practical: food tests</li> <li>• the human nervous system</li> <li>• reflex actions</li> <li>• the endocrine system</li> <li>• negative feedback</li> </ul> <p><b>chapter 2.2 plants and photosynthesis</b></p> <ul style="list-style-type: none"> <li>• meristems</li> <li>• plant structures</li> <li>• transpiration</li> <li>• looking at stomata</li> <li>• rate of transpiration</li> <li>• chlorophyll / plant pigment required</li> <li>• practical: paper chromatography</li> </ul> | <ul style="list-style-type: none"> <li>• factors affecting photosynthesis</li> <li>• tables and graphs</li> <li>• how light affects the rate of photosynthesis</li> <li>• translocation</li> <li>• plant diseases</li> </ul> <p>4.3 interactions with the environment</p> <p><b>Topic 3</b></p> <p><b>chapter 3.1 lifestyle and health</b></p> <ul style="list-style-type: none"> <li>• health and disease</li> <li>• risk factors for non-communicable diseases</li> <li>• treatments for cardiovascular diseases</li> <li>• analysing and interpreting data</li> <li>• homeostasis</li> <li>• controlling blood glucose</li> <li>• diabetes</li> <li>• human reproductive hormones</li> <li>• contraception</li> <li>• Which contraceptive?</li> <li>• treatment for infertility</li> <li>• IVF evaluation</li> </ul> | <ul style="list-style-type: none"> <li>• absorption and emission of radiation</li> <li>• radioactivity</li> <li>• nuclear equations</li> <li>• half-life</li> <li>• lines of best fit</li> <li>• penetration properties of radiation</li> <li>• contamination / irradiation</li> <li>• risks of ionising radiation</li> <li>• cancer</li> </ul> <p><b>chapter 3.3 preventing, treating, curing disease</b></p> <ul style="list-style-type: none"> <li>• spread of communicable disease</li> <li>• viral disease</li> <li>• bacterial disease</li> <li>• defence against pathogens</li> <li>• the human immune system</li> <li>• vaccination</li> <li>• medicines</li> <li>• testing new drugs</li> <li>• genetic modification</li> <li>• stem cells</li> <li>• interactions of different types of diseases</li> <li>• sampling data</li> </ul> | <ul style="list-style-type: none"> <li>• changes in atmosphere</li> <li>• the carbon cycle</li> <li>• greenhouse effect</li> <li>• human impact on climate</li> <li>• effects of climate change</li> <li>• mitigating the effects of climate change</li> <li>• air pollution</li> <li>• the water cycle</li> <li>• required practical: analysis and purification of water samples from different sources, including pH dissolved solids and distillation</li> <li>• sources of potable water</li> <li>• use ratios, fractions and percentages</li> </ul> <p><b>chapter 4.2 ecosystems and biodiversity</b></p> <ul style="list-style-type: none"> <li>• habitats and communities</li> <li>• interdependence and competition</li> <li>• factors that affect communities</li> <li>• required practical: investigating the population size of a common species in a habitat</li> <li>• biodiversity</li> </ul> |
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|  |                          |                                                                                                                                                                                 |                                                                                                                                                  |                                                                                                                                        |                                                                                                                                            |                                                                                                                                                    | <ul style="list-style-type: none"> <li>• negative human impact on ecosystems</li> <li>• positive human impacts on ecosystems</li> </ul> <p><b>chapter 4.3 inheritance</b></p> <ul style="list-style-type: none"> <li>• chromosomes and genes</li> <li>• sex determination in humans</li> <li>• single gene inheritance</li> <li>• genotype and phenotype</li> </ul> <p><b>chapter 4.4 variation and evolution</b></p> <ul style="list-style-type: none"> <li>• mutations</li> <li>• evolution through natural selection</li> <li>• evidence for evolution</li> <li>• identification and classification of living things</li> <li>• selective breeding</li> <li>• genetic breeding</li> <li>• gee technology (benefits/risks)</li> <li>• using charts and graphs to display data</li> </ul> |
|  | <b><u>Assessment</u></b> | <p><b>Baseline assessment:</b>Building blocks: from atoms to cells, behaviour and transport on the small scale.</p> <p><b>End of unit assessment:</b> carried into autumn 2</p> | <p><b>Baseline assessment:</b> Transport over larger distances</p> <p><b>End of unit assessment:</b> Building blocks: end of unit assessment</p> | <p><b>Baseline assessment:</b>Transport over larger distances</p> <p><b>End of unit assessment:</b>Transport over larger distances</p> | <p><b>Baseline assessment:</b>interactions with the environment</p> <p><b>End of unit assessment:</b>interactions with the environment</p> | <p><b>Baseline assessment:</b>4.3 interactions with the environment</p> <p><b>End of unit assessment:</b>4.3 interactions with the environment</p> | <p><b>Baseline assessment:</b> Explaining change</p> <p><b>End of unit assessment:</b> Explaining change</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

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|  |  |  | Transport over larger distances |  |  |  |  |
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| Key stage 4               |                                                                                                                                        | Autumn 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Autumn 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Spring 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | Spring 2                                                                                                                                                                                                                                                                                                                                                                                                             | Summer 1                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Summer 2                                                                                                                                                                                                          |
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| Year 11 GCSE phase 2 of 2 | Title of unit                                                                                                                          | <p>4.5 Building blocks for understanding:</p> <p>4.6 Interactions over small and large distances:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>4.6 Interactions over small and large distances:</p> <p>4.7 Movement and interactions</p>                                                                                                                                                                                                                                                                                                                                                                                                           | <p>4.7 Movement and interactions:</p>                                                                                                                                                                                                                                                                                                                                                                                                                | <p>4.7 Movement and interactions:</p> <p>4.8 Guiding Spaceship Earth towards a sustainable future:</p>                                                                                                                                                                                                                                                                                                               | <p>4.8 Guiding Spaceship Earth towards a sustainable future:</p> <p>revision sessions and exam preparation</p>                                                                                                                                                                                                                                                                                                                                                   | <p>revision sessions and exam preparation</p>                                                                                                                                                                     |
|                           | Non Negotiable end-points (these will be the key learning objectives plotted out within MTPs. You don't need to include them all here) | <p>4.5 Building blocks for understanding: organising, patterns, properties and analysis.</p> <p><b>Topic 5- building blocks for understanding</b></p> <p><b>chapter 5.1 the periodic table</b></p> <ul style="list-style-type: none"> <li>atomic number and the periodic table</li> <li>electronic structure</li> <li>mendeleev's periodic table</li> <li>metals &amp; non metals</li> <li>atoms into ions</li> <li>exploring group 0,1,7</li> </ul> <p><b>chapter 5.2 chemical quantities</b></p> <ul style="list-style-type: none"> <li>chemical equations</li> <li>conservation of mass/balanced equations</li> </ul> | <p>4.6 Interactions over small and large distances: strong and weak forces between atoms, molecules and larger structures and how they interact.</p> <p><b>chapter 6.2 structure and bonding</b></p> <ul style="list-style-type: none"> <li>types of chemical bonding</li> <li>ionic bonding</li> <li>ionic compounds</li> <li>properties of ionic compounds</li> <li>covalent bonding</li> <li>properties of small covalent molecules</li> <li>polymers</li> <li>giant covalent structures</li> </ul> | <p>4.7 Movement and interactions: rates of change of motion and direction of large and small objects, and chemical changes.</p> <p><b>chapter 7.2 electricity</b></p> <ul style="list-style-type: none"> <li>electric current</li> <li>current, resistance, potential difference</li> <li>difference between potential current and current</li> <li>ohmic and non-ohmic conductors</li> <li>control circuits</li> <li>required practical:</li> </ul> | <p>4.8 Guiding Spaceship Earth towards a sustainable future: resources of materials and energy.</p> <p><b>chapter 7.4 rate and extent of chemical change</b></p> <ul style="list-style-type: none"> <li>progress of reaction</li> <li>calculating rates</li> <li>factors affecting rate</li> <li>effect of surface area on reaction rate</li> <li>collision theory</li> <li>use the slope of a tangent as</li> </ul> | <p>4.8 Guiding Spaceship Earth towards a sustainable future:</p> <p><b>Topic 8 Guiding Spaceship Earth towards a sustainable future</b></p> <p><b>chapter 8.1 carbon chemistry</b></p> <ul style="list-style-type: none"> <li>diamond</li> <li>graphite</li> <li>graphene and fullerenes</li> <li>hydrocarbons in crude oil</li> <li>fractional distillation in crude oil</li> <li>properties in hydrocarbon</li> <li>combustion of hydrocarbon fuels</li> </ul> | <p><a href="#"><u>zig zag education exam booklets.</u></a></p> <p><a href="#"><u>revision guides.</u></a></p> <p><a href="#"><u>textbook assessments</u></a></p> <p><a href="#"><u>progress checklist</u></a></p> |

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|  |  | <ul style="list-style-type: none"> <li>explaining observed changes in mass</li> <li>relative formula mass</li> <li>amounts in moles</li> <li>using balanced equations to calculate masses</li> <li>balancing equations</li> <li>amounts of reactants in products</li> <li>concentrations of solutions</li> <li>amounts in chemistry</li> <li>change the subject in equation</li> </ul> <p><b>Topic 6- interactions</b><br/><b>chapter 6.1 forces and energy changes</b></p> <ul style="list-style-type: none"> <li>forces as vectors</li> <li>combining forces</li> <li>finding forces from a vector diagram</li> <li>work</li> <li>mass &amp; weight</li> <li>gravitational potential energy</li> <li>elastic deformation</li> <li>required practical: investigate the relationship between force and the extension of a spring</li> </ul> | <ul style="list-style-type: none"> <li>intermolecular forces</li> <li>metallic bonding</li> <li>properties of metals</li> <li>visualise and represent 2d and 3d shapes</li> </ul> <p><b>chapter 6.3- magnetism and electromagnetism</b></p> <ul style="list-style-type: none"> <li>magnets</li> <li>magnetic fields</li> <li>earth's magnetism</li> <li>magnetic effect if an electric current</li> <li>magnetic field due to solenoid</li> <li>the motor effect</li> <li>calculating a force on a conductor</li> <li>electric motors</li> <li>the link between electricity and magnetism</li> </ul> <p><b>Topic 7 - movement and interactions</b><br/><b>chapter 7.1 forces and motion</b></p> <ul style="list-style-type: none"> <li>speed and velocity</li> <li>distance/speed/time</li> <li>acceleration</li> <li>using velocity/time graphs</li> <li>using an equation for uniform motion</li> <li>freefall</li> <li>newtons 1st law</li> <li>newtons 2nd law</li> <li>required practical: investigating the acceleration of an object</li> <li>newton's 3rd law</li> <li>momentum</li> <li>kinetic energy</li> </ul> | <p>investigate characteristics of a filament lamp, a diode and resistor at constant temperature</p> <ul style="list-style-type: none"> <li>series and parallel circuits</li> <li>required practical: use circuit diagrams to investigate the factors affecting the resistance of electrical circuits</li> <li>electricity in the home</li> <li>power</li> <li>power of an electrical device</li> <li>power an domestic appliances</li> <li>the national grid</li> <li>understanding formulae and understanding graphs</li> <li>calculations using significant figures</li> </ul> <p><b>chapter 7.3 acids and alkalis</b></p> <ul style="list-style-type: none"> <li>reactions of metals with acids</li> <li>making salts</li> <li>reactions of carbonates with acid</li> <li>required practical: preparing dry salt from an</li> </ul> | <p>a measure of rate of change</p> <ul style="list-style-type: none"> <li>required practical: investigate how changes in concentration affect the rate of reactions</li> <li>activation energy</li> <li>bond breaking and bond forming (HT only)</li> <li>catalysts</li> <li>enzymes</li> <li>required practical: investigate the effect of pH on the rate of reaction</li> <li>reversible reaction</li> <li>dynamic equilibrium</li> <li>effect of concentration on position of equilibrium (HT only)</li> <li>effect of temp on position of equilibrium (HT only)</li> <li>effect of pressure on position of equilibrium (HT only)</li> <li>translate information between graphical and numerical form</li> </ul> <p><b>chapter 7.5 atoms into ions and ions into atoms</b></p> | <ul style="list-style-type: none"> <li>cracking hydrocarbons</li> <li>visualise and represent 3d models</li> </ul> <p><b>chapter 8.2 resources of materials and energy</b></p> <ul style="list-style-type: none"> <li>electron transfer, oxidation and reduction</li> <li>metal extraction by reduction of oxides</li> <li>metal extraction by electrolysis</li> <li>metal extraction by biological methods</li> <li>energy resources</li> <li>energy conservation and dissipation</li> <li>preventing unwanted energy transfers</li> <li>energy efficiency</li> <li>life cycle assessment</li> <li>interpreting data</li> <li>recycling</li> </ul> |  |
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|  |                          |                                                                                                                                   | <ul style="list-style-type: none"> <li>stopping distances</li> </ul>                                                                                                                      | insoluble oxide or carbonate <ul style="list-style-type: none"> <li>energy changes and reactions</li> <li>required practical: investigate the variables that affect temperature changes in reacting solutions</li> <li>pH scale and neutralisation</li> <li>strong and weak acids</li> </ul> | <ul style="list-style-type: none"> <li>a reactivity series for metals</li> <li>the process of electrolysis</li> <li>electrolysis of molten ionic compounds</li> <li>electrolysis of aqueous solutions</li> <li>required practical: investigate what happens when aqueous solutions are electrolysed using inert electrodes</li> <li>test for gases</li> </ul> |                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                           |
|  | <b><u>Assessment</u></b> | <b>Baseline assessment:</b> building blocks baseline<br><br><b>End of unit assessment:</b> building blocks end of unit assessment | <b>Baseline assessment:</b> interactions over small and large distances baseline<br><br><b>End of unit assessment:</b> interactions over small and large distances end of unit assessment | <b>Baseline assessment:</b> movement and interactions baseline<br><br><b>End of unit assessment:</b> movement and interactions end of unit assessment                                                                                                                                        | <b>Baseline assessment:</b> guiding a spaceship towards a sustainable future baseline<br><br><b>End of unit assessment:</b> guiding a spaceship towards a sustainable future baseline                                                                                                                                                                         | <u><b>zig zag education exam booklets.</b></u><br><br><u><b>revision guides.</b></u><br><br><u><b>textbook assessments</b></u><br><br><u><b>progress checklist</b></u><br><br>students to complete topic by topic exam papers, review and reflect on these using the AQA synergy textbook | <u><b>zig zag education exam booklets.</b></u><br><br><u><b>revision guides.</b></u><br><br><u><b>textbook assessments</b></u><br><br><u><b>progress checklist</b></u><br><br>students to complete topic by topic exam papers, review and reflect on these using the AQA synergy textbook |