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| **Year 5** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1 and 2** |
| **Topic:**  **To the Stars** | **Topic:**  **Forces** | **Topic:**  **Life Cycles** | **Topic:**  **Animals including humans** | **Topic:**  **Materials & their properties** |
| **Concept:**  Spherical bodies, movement of Earth, planets and moon in relation to each other, Earth’s rotation – day and night | **Concept:**  A force can change an object’s shape, speed or direction | **Concept:**  Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including plants. | **Concept:**  Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird  What are the stages of growth and development  in humans?  What are the stages in the gestation period of humans  and how do they differ to animals?  What are the life cycles of different mammals? | **Concept:**  Know different properties of materials including their hardness, solubility, transparency, conductivity(electrical and thermal) and response to magnets.  Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.  Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating |
| **Skills:**  Take measurements with increasing accuracy, identify scientific evidence that has been used to support or refute arguments, report and present findings in a variety of ways, use test results to make predictions and set up further comparative tests. | **Skills:**  Labelling scientific diagrams, measurements – repeating readings, recognising and controlling variables, discussing reasons why conclusions may be uncertain.  Being able to measure forces using a Newton meter  Being able to draw force diagrams showing the size and direction of the force.  Being able to plan and carry out a fair and valid test | **Skills:**  Identify how living things grow sexually and asexually – grow celery and beans. | **Skills:**  Identify changes in how we get older, identify the stages of gestation and compare animals. Learn about Jane Goodall and her work | **Skills:**  Compare and group together everyday materials by their properties.  Record data of increasing complexity using scientific diagrams and labels  reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.  Identifying scientific evidence that has been used to support or refute ideas or arguments |
| **Outcome:**  To understand the phases of the moon  To know how a shadow is formed. | **Outcome:**  To identify different types of forces  To explain that some forces are useful and some are not | **Outcome:**  To understand the difference between asexual and sexual reproduction especially in plants.  To identify the parts of a plant and what each part does  To understand about seed dispersal | **Outcome:**  To understand the stages of growth and development  in humans.  To identify the stages in the gestation period of humans and how do they differ to animals?  To know the life cycles of different mammals? | **Outcome:**  To be able to sort everyday materials  on the basis of their properties.  To identify and explain irreversible chemical changes. |

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| **Year 6** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Topic: Electricity** | **Topic: Light** | **Topic: Classification** | **Topic: Evolution and inheritance** | **Topic: Human Body** | **Topic: Famous Scientists and Inventors** |
| **Knowledge/ Concepts:**  Symbols and circuit diagrams,  brightness of bulbs or volume of buzzer or speed of motor related to number and voltage of cells, switches,  series and parallel circuits,  resistance in wires. | **Knowledge/ Concepts:**    Light travelling in straight lines, how we see objects, the eye, reflection, opaque/transparent and translucent materials,  shadows, rainbows and colour spectrum,  refraction through water. | **Knowledge/ Concepts:**  Classification into broad groups including animals, plants and microorganisms  Giving reasons for classification | **Knowledge/ Concepts:**  Inheritance  Offspring and variation  Adaptation of animals and plants to suit their environment  Evolution  Fossils, | **Knowledge/ Concepts:**  parts and functions of the human circulatory system, heart, blood vessels and blood  impact of diet, exercise, drugs and lifestyle on bodies  transport of nutrients and water within animals, including humans  Keeping bodies healthy and damage from drugs and other substances | **Knowledge/ Concepts:**  Work of palaeontologists such as Mary Anning, Mary Leakey, Charles Darwin and Alfred Wallace developing their ideas on evolution.  Work of Scientists like Stephen Hawking on Black holes, Alexander Fleming on Penicillin,  Marie Maynard Daly findings on diet and heart health, Daniel Hale Williams work on circulatory system,  Steve Jobs work on electronics to design computers. |
| **Skills:**    Identifying scientific evidence that has been used to support or refute ideas or arguments in the context of the major discoveries made by scientists in the field of electricity.  Record data and results using scientific diagrams and labels.  Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.  Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. | **Skills:**  Record data of increasing complexity using scientific diagrams and labels, bar and line graphs.  Report findings using causal relationships.  Planning scientific enquiries to answer questions, including recognising and controlling variables where necessary.  Taking measurements, with increasing accuracy and precision, taking repeat readings when appropriate.  using test results to make predictions to set up further comparative and fair tests.  Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results. | **Skills:**  Recording data and results of increasing complexity using classification keys. | **Skills:**  Record data of increasing complexity using scientific diagrams and labels.  Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.  Identifying scientific evidence that has been used to support or refute ideas or arguments | **Skills:**  Planning scientific enquiries, taking measurements, recording data and results,  reporting and presenting findings from enquiries, including conclusions,  identifying scientific evidence that has been used to support or refute ideas or arguments. | **Skills:**  Report and present findings from enquiries, including causal relationships, in oral and written forms such as displays and other presentations.  Record data using scatter graphs and labelled diagrams. |
| **Outcome:**  To plan and carry out investigations related to how brightness of lamps is affected by changes to wires/voltages. | **Outcome:**  To know how the human eye works (how we see).  To plan and carry out investigations related to shadows/refraction/reflection  To report findings in tables and graphs and to write conclusions using scientific vocabulary and causal conjunctions to relationships. | **Outcome:**  To be able to read and produce keys to sort and classify living organisms. | **Outcome:**  To use scientific vocabulary to explain clearly:  Inheritance  Offspring and variation  Adaptation of animals and plants to suit their environment  Evolution  Fossils | **Outcome:**  To know how the human circulatory system works.  To plan and carry out investigations related to how exercise affects the human body.  To be able to explain how to stay healthy | **Outcome:**  To produce a scientifically relevant presentation both written and oral. |

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| **Year 7** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** |
| **Topic:**  **Organisms: Movement and Cells**  **Earth Structure & Universe** | **Topic:**  **Matter: - Particles and separation techniques.** | **Topic:**  **Energy:**  **Energy Costs and Energy Transfer**  **Genes: -Variation and Human Reproduction** | **Topic:**  **Matter: Periodic Table & Elements**  **Electromagnets: Voltage & Current** | **Topic:**  **Reactions: - Metals, non-metals, acids and alkalis.**  **Ecosystems: Interdependence & Plant Reproduction** |
| **Concept:**  **Organisms:**  Cells are the fundamental unit of living organisms  Identify the similarities and differences between different cells (animal, plant)  Structural adaptations of unicellular organisms  Hierarchical organisation of multicellular organisms  Understand diffusion  Understand the differences between species  **Earth:**  The layers of the Earth and how they interact with each other and how they are responsible for some of the characteristics of our planet.  The rock cycle  Tsunamis, Earthquakes and volcanic eruptions  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. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies. | **Concept:**  **Matter**:  All matter is made up of particles\*  All particles move, when heated they move faster  All particles are attracted; some are more attracted that other.  Filtration, evaporation, distillation, chromatography  Different particles have different properties which can be used to separate them  Pure and impure substances  Mixtures can form when solutes break down in solvents  In a mixture there are no fixed ratios, but the ratios can be measured | **Concept:**  **Energy:-**  Energy can be quantified and calculated  Processes involving energy transfer  Fuels and energy resources  Work done  Energy stores  Law of conservation of energy  **Genes: -**  Some characteristics are passed on by genes, some are caused by your environment  How characteristics are passed on from parents to offspring.  Some knowledge of genetic disorders and their symptoms  Natural selection vs survival of the fittest  Reproduction in humans including the structure and function of the male & female reproductive systems, menstrual cycle, gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.  The variation between species and between individuals of the same species and the effect on natural selection. Changes in the environment may leave individuals within some species less well adapted to compete and to successfully reproduce which may in turn may lead to extinction.  The importance of biodiversity and the use of gene banks to preserve hereditary material. | **Concept:**  **Matter:**  The varying physical and chemical properties of different elements.  The principles underpinning the Mendeleev Periodic Table.  The periodic Table: Periods and groups.  How patterns in reactions can be predicted.  **Electromagnets:**   |  | | --- | | Electricity is the flow of electrons moving through a conductor. |   Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge  Potential Difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.  Differences in resistance between conducting and insulating components (quantitative) | **Concept:**  **Reactions: -**  Key characteristics of metals and non-metals  Some metals are more reactive than others (group 1 and 2 metals)  Salts can be made when metals and non-metals form a compound.  The pH scale  Acids and alkalis reacts together to form a salt and water (neutralisation reaction)  Examples of every day acids and alkalis  Name salts based on the acid used.  **Ecosystems: -**  Living organisms depend on each other in a food web  There are predators, prey, producers and consumers, herbivores, carnivores and omnivores  Understanding why keeping track of the numbers of organisms in species is important  Describing how toxins can accumulate in a food chain and identifying some things species compete for to survive. Understanding how different species are adapted in different ways to their environment.  Reproductive organs of flowering plants.  Adaptations in seed dispersal |
| **Skills:**  Microscope, making slides, drawing scientific diagrams  Presenting work to the class (in different ways)  Research skills (ICT and books)  Meeting deadlines  Working in groups/team work | **Skills:**  Basic lab skills, measuring using precise tools. Be able to use Bunsen burners safely  Being able to use lab equipment safely, being able to separate different types of mixtures using several separation techniques | **Skills:**  Planning and carrying out a fair test, measuring energy changes, plotting graphs, calculating averages and spotting pattern in data.  Carrying out a fair test, analysing and finding patterns in data. | **Skills:**   |  | | --- | | Being able to use a model to explain things we cannot see  Being able to draw particle diagrams of elements and compounds  Being able to make a simple compound.  Make a simple circuit using basic components such as bulbs and switches.  Being able to measure the current and potential difference in a circuit | | **Skills:**  Describing the reactions of group 1 metals with water  Using different techniques to distinguish between metals and non-metals  Using (universal) indicator to identify acids and alkalis  Safe use of chemicals and lab equipment and being able to identify risks |
| **Outcome:**  **Organisms:**  Being able to prepare slides and get a clear image under the microscope  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.  Explain why multi-cellular organisms need organ systems to keep their cells alive.  Explain how uni-cellular organisms are adapted to carry out functions that, in multi-cellular organisms, are done by different types of cell.  Describe the structure and function of joints.  Interpret observations in a chicken wing to describe how the muscles work together to cause movement.  Use a diagram to predict the result of a muscle contraction or relaxation.  **Earth:**  Name some objects in the Solar System Explain how we see planets  Identify some patterns in the Solar System  Describe differences between seasons  Describe the motion of the Sun, stars, and Moon across the sky  Name some phases of the Moon  Show the different phases of the Moon using models provided  To understand that our planet is changing and that it can have major consequences to the human population. | **Outcome:**  Explain the properties of solids/liquid, and gas samples using the particle model  Explain dissolving (using particles)  Explain diffusion (using particles)  Explain some of the effects of air pressure  Being able to identify the correct separation technique to be used  Application of taught knowledge to an unknown mixture. | **Outcome:**  **Energy:**  Being able to explain energy transfer using previously gained knowledge of particles  Identify energy transfers and stores  Explain how energy dissipates.  Name renewable and non-renewable energy resources.  State one advantage and one disadvantage of fossil fuels  Name a renewable resource used to generate electricity    **Genes: -**  Understand what is meant by the term variation  State that variation is caused by the environment or inheritance  Record observations of variations between different species of gull  State that there are two types of variation  Give a possible reason for adaptation or extinction.  Identify human reproductive organs and their role.  Describing the developmental stages from a fertilised egg cell to a foetus  Being able to explain the terms ovulation, menstruation and fertilisation | **Outcome:**  State the unit of potential difference  Describe the effect of a larger potential difference  Use appropriate equipment to measure potential difference  State one difference between series and parallel circuits  State how potential difference varies in series and parallel circuits  State what current is  Use an ammeter to measure current  Identify the pattern of current in series and parallel circuits  Describe how to charge insulators  State the two types of charge  State what surrounds charged objects  Describe what happens when you bring similarly charged object together, and when you bring differently charged objects together | **Outcome:**  **Reactions:**  Understanding the use of metals and alloys in everyday life  Understanding the use of acids and alkalis in cleaning products.  Understanding the dangers of acids and alkalis  **Ecosystems:**  Interpret secondary data to describe simple predator–prey relationships.  Combine food chains to form a food web.  Explain issues with human food supplies in terms of insect pollinators.  Interpret secondary data to describe trends and draw conclusions about predator–prey relationships. Explain how toxic materials can accumulate in human food sources.  Make a deduction based on data about what caused a change in the population of a species.  Explain why seed dispersal is important to survival of the parent plant and its offspring. |

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| **Year 8** | **Autumn 1** | **Autumn 2** | **Spring 1** | **Spring 2** | **Summer 1** | **Summer 2** |
| **Topic:**  **Organisms: Breathing & Digestion** | **Topic: Ecosystems: Respiration & Photosynthesis**  **Matter: Periodic Table & Elements** | **Topic:**  **Reactions: Chemical Energy & Types of Reaction**  **Earth: Climate & Earth Resources** | **Topic:**  **Forces:**  **Contact Forces & Pressure**  **Electromagnets & Magnetism** | **Topic:**  **Genes: Evolutions & Inheritance**  **Waves: Wave Properties & Wave effects** | **Topic:**  **Energy: Work & Heating & Cooling** |
| **Concept:**  Identify the different organs in the human body and describe their function. Understand how organs work together in an organ system (skeletal system, digestive system, muscular system, respiratory system, circulatory system).  Balanced Diets  Food Tests.   |  | | --- | | (skeletal system, digestive system, muscular system, respiratory system, circulatory system)  Balanced diet  Food Tests. | | **Concept:**  **Ecosystems:**  Reaction equation for photosynthesis and the factors affecting the rate.  Plants use the glucose from photosynthesis to make many other substances and well as using it as an energy source in respiration.  Reaction equations for aerobic and anaerobic respiration  If insufficient oxygen is supplied anaerobic respiration takes place in muscles. The incomplete oxidation of glucose causes a build-up of lactic acid and creates an oxygen debt. During long periods of vigorous activity muscles become fatigued and stop contracting efficiently.  Metabolism is the sum of all the reactions in a cell or the body.  **Matter:**  All material is made up of particles. The simplest type of particle is called an atom. | **Concept:**  **Reactions:**  Some elements are more reactive than others  What are the signs of a chemical reaction taking place?  What is the difference between a chemical reaction and a physical change?  What are exo- and endothermic reactions.  **Earth:**    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 | **Concept:**  **Forces:**  Moment as the turning effect of a force.  Forces associated with deforming objects; stretching and squashing-springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water.  Forces measured in Newtons, measurements of stretch or compression as force is changed.  Force- extension linear relation; Hooke’s Law as a special case  Work done and energy changes om deformation.  Non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.  **Electromagnets:**  How the strength of an electromagnet can be changed. | **Concept:**  **Genes:**  Some characteristics are passed on by genes, some are caused by your environment  How characteristics are passed on from parents to offspring.  Some knowledge of genetic disorders and their symptoms  Natural selection vs survival of the fittest.  **Waves:**  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.  Explain how audio  equipment converts sound  into a changing pattern of  electric current.  Waves of higher  amplitude or higher  frequency transfer more  energy.  Explain differences  in the damage done to living cells by light and other waves, in terms of their frequency. | **Concept:**  Work done is energy transferred  Effort can be reduced by using simple machines  Heat energy can be transferred through conduction, convection and radiation.  -  energy transfers from the  hotter to the cooler object.  - 3.3.4 Explain  observations about.  changing temperature in  terms of energy transfer.  - 3.3.4 Describe how an  object’s temperature  changes over time when  heated or cooled.  Thermal energy is  transferred through  different pathways, by  particles in conduction and  convection, and by  radiation.  - 3.3.4 Explain how a  method of thermal  insulation works in terms  of conduction, convection,  and radiation.  - 3.3.4 Sketch diagrams to  show convection currents  in unfamiliar situations.  Thermal energy is  transferred through  different pathways, by  particles in conduction and  convection, and by radiation.  - 3.3.4 Explain how a  method of thermal  insulation works in terms  of conduction, convection,  and radiation. |
| **Skills:**  Simple food tests  Dissection of a lungs | **Skills:**  Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed  Plot and draw appropriate graphs selecting appropriate scale for axes .  Being able to use a model to explain things we cannot see  Being able to draw particle diagrams of elements and compounds  Being able to make a simple compound | **Skills:**  Being able to carry out safe experiments using the Bunsen burner  Being able to observe closely and take accurate readings  Being able to recognise and interpret an energy profile for exo- and endothermic reactions.  ICT skills  Interpreting graphs and understand use of models to make scientific predictions | **Skills:**  Make an electromagnet. | **Skills:**  Predict genetic outcomes – using Punnett squares  Research on genetic disorders  Data analysis of predator-prey cycles. | **Skills:**  Being able to carry out safe practical work  Being able to get accurate results  Being able to plot a graph based on results and analyse data collected. |
| **Outcome:**  Research of organ systems going wrong  Being able to identify organs  Being able to explain how organ systems work together  Being able to design a menu for different people.  Carry out simple food tests. | **Outcome:**  **Ecosystems:**  Be able to describe photosynthesis a reaction in which energy is transferred from the environment to the chloroplasts by light.  Be able to describe cellular respiration as a reaction which is continuously occurring in living cells.  Be able to recall the word equations for aerobic, anaerobic respiration and alcoholic fermentation.  **Matter:**  Being able to identify elements and compounds from particle diagrams  Being able to classify metals and non-metals and describe the key properties  Being able to find basic elements in the periodic table  Know the symbols for the first 20 elements in the periodic table | **Outcome:**  **Reactions:**  Classify unknown reactions  **Earth:**  Use a diagrams and models to show how carbon is recycled in the environment and through living things.  Describe how human activities affect the carbon cycle.  Describe how global warming can impact on climate and local weather patterns. | **Outcome:**  **Forces:**  Use Hooke’s Law to identify proportional stretching  State how you know from a graph that a relationship is linear, present data in a line graph, and identify a pattern.  State the law of moments  State the equation to calculate a turning force  Describe the motion of particles in a fluid  Calculate fluid pressure with support  State simply what happens to pressure with depth  Describe characteristics of some objects that float and some that sink  Write down the equation for calculating fluid pressure  State the equation of stress  Use ideas of stress to describe familiar situations qualitatively  Predict qualitatively the effect of changing area and/or force on stress  **Electromagnets:**  Test the effect of changing an electromagnet.  State some uses of electromagnets. | **Outcome:**  **Genes:**  Natural selection  is a theory that explains how species evolve and why extinction occurs.  Use evidence to  explain why a species has  become extinct or adapted to changing conditions.  Predict and explain the changes in a  population over time due to natural selection.  **Waves:**  Name some waves of the electromagnetic spectrum  Name the electromagnetic wave with the biggest wavelength  Name an electromagnetic wave that can be harmful to living cells.  Define ‘transverse'  Describe a model of a light wave  Define ‘superpose’ | **Outcome:**  Understanding that heat is always transferred from an area where there is more to an area where there is less energy  Describe how an object’s temperature changes over time when heated or cooled.  Explain how a method of thermal insulation works in terms of conduction, convection and radiation.  Sketch diagrams to show convection currents in unfamiliar situations. |