| Science | Curriculum Intent |
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| | ‘It is important to view knowledge as sort of a semantic tree – make sure you understand the fundamental principles, i.e. the trunk and big branches, before you get into the leaves/details or there is nothing for them to hang on to.’<br>*Elon Musk*<br><br>Our aim is to develop scientific literacy in pupils in order to prepare them for life in an increasingly technologically advanced world where scientific issues impact on both their everyday lives and some of the most urgent public policy debates. In learning the scientific method, pupils learn to think critically, solve problems and make informed decisions. We actively encourage pupils to be independent and self-reflective in their learning and endeavour to establish in them a lifelong interest in science. |

| Year 7 | By the end of Year 7 students should: |
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| Knowledge | **Cell and survival:**<br>➢ Explain the functions of the organelles in animals and plant cells<br>➢ Describe how specialised cells are adapted to their function<br>➢ Explain organisation in unicellular and multicellular organism<br>**Classification and variation:**<br>➢ Describe how organisms are classified<br>➢ Describe causes of variation<br>➢ Use Charles Darwin’s theory of Natural Selection to explain evolution<br>**Ecosystems:**<br>➢ Construct food chains, webs and pyramids of number and biomass<br>➢ Describe how organisms are adapted to different environmental conditions within their habitat.<br>**Particles:**<br>➢ Draw and describe the structure of the 3 states of matter<br>➢ Use kinetic theory to explain changes of state<br>**Solutions:**<br>➢ Define the term ‘mixture’ |

- Use the particle model to explain dissolving
- Explain how mixtures can be separated using different techniques

**Acids and alkalis:**

- State the properties and uses of acids and alkalis
- To be able to use indicators to identify the pH of acids and alkalis
- Explain what the term 'neutralisation' means

**Energy:**

- Recall the different energy stores and pathways
- Recall that energy cannot be created or destroyed. Describe how energy can be transferred between the different energy stores.
- Explain how electricity can be produced using both renewable and non-renewable energy resources

**Forces and their effects:**

- Identify different forces and be able to draw scaled force diagrams
- Describe how balanced and unbalanced forces effect the motion of an object
- Identify contact and non-contact forces

**Sound and hearing**

- Explain how sound travels through different states of matter
- Explain how amplitude and frequency of a wave link to the sound produced
- Describe the structure of the ear

**Magnets and electromagnets:**

- Identify magnetic materials
- Draw and describe the magnetic field lines around a bar magnet
- Explain how to increase the strength of an electromagnet and list some of their uses

**The solar system and beyond:**

- Describe the structure of our solar system. Describe the changing phases of the moon and explain how the moon's gravity causes the tides
- Describe how the rotation, tilt and orbit of the Earth causes days, seasons and years.
- Describe the stages in a stars lifecycle

| Skills | |
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| | ➢ Write a hypothesis and prediction for an investigation<br>➢ Identify the independent, dependent and controlled variables in an investigation<br>➢ Identify whether data is categoric or continuous and draw an appropriate graph |

| Year 8 | By the end of Year 8 students should: |
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| Knowledge | **Respiration:**<br>➢ Recall that all living things respire and recall the equation for aerobic and anaerobic respiration<br>➢ Describe the structure of the respiratory and circulatory system<br>**Food and digestion:**<br>➢ To describe the components of a balanced diet<br>➢ Describe the structure of the digestive system and explain how enzymes break down large insoluble molecules so they can be absorbed into the bloodstream<br>**Ecological relationships:**<br>➢ Describe how sampling techniques can be used to measure all of the organisms within a habitat<br>➢ Recall that animals and plants compete for environmental resources and are adapted to environment that they live in<br>➢ Analysing data helps us to understand how the numbers of predators and prey a community are related<br>**Human Reproduction:**<br>➢ Recall the adaptations of a sperm and an egg and explain the process of fertilisation<br>➢ Describe the effect of hormones on adolescence, menstrual and menopause<br>➢ Explain the role of the placenta during placenta<br>**Plant reproduction**<br>➢ Describe the structure of a plants reproductive system<br>➢ Explain the process of pollination and how seeds are dispersed<br>**Atoms and Elements:**<br>➢ Define the term ‘atom’ and ‘element’<br>➢ Describe how Mendeleev arranged the elements in the periodic table<br>**Chemical reactions:** |

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| | ➢ Identify reactants and products in a chemical reaction<br>➢ Recall the products of metal and acid and metal and carbonate reaction. To be able to identify the gases produced using chemical tests.<br>➢ Recall the products of a combustion reaction<br>**Compounds and mixtures:**<br>➢ Model reactions using word and symbol equations<br>➢ Recall the difference between a compound and a mixture<br>➢ Identify pure substances using their melting and boiling point data.<br>**The rock cycle:**<br>➢ Describe how igneous, sedimentary and metamorphic rocks are formed.<br>➢ Explain how the rock cycle changes one type of rock into another<br>**Heating and Cooling:**<br>➢ Explain how thermal energy can be transferred by conduction, convection and radiation<br>➢ Recall that when a difference in temperature occurs, thermal energy will transfer until it is evenly spread and the temperature equalised.<br>**Light:**<br>➢ Define the term 'luminous'<br>➢ Describe how light can be reflected or refracted at a boundary<br>➢ Recall that white light is a mixture of coloured lights called a spectrum<br>**Speed:**<br>➢ Explain how balanced and unbalanced forces can affect the motion of an object<br>➢ Recall the equation for calculating speed and to be able to interpret distance-time graphs<br>**More non-contact forces:**<br>➢ Explain what causes static electricity and how charged objects interacts with one another<br>➢ Recall the equation for weight<br>➢ Explain how gravity influences orbits of plants, moons and star systems |
| Skills | ➢ Choose a suitable interval and range for the independent variable<br>➢ Collect accurate data and identify anomalies<br>➢ Evaluate whether an investigation is precise, repeatable and reproducible |

| Year 9 | By the end of Year 9 students should: |
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| Knowledge | **Plants for photosynthesis**<br>➢ Recall the equation for equations for photosynthesis and explain how plants store excess glucose<br>➢ Explain how a leaf is adapted for photosynthesis<br>➢ Explain how decay recycles materials<br>**Plants for food:**<br>➢ Explain how photosynthesis can be limited by light, carbon dioxide and temperature<br>➢ Explain how fertilisers cause eutrophication<br>➢ Explain how herbicides and pesticides can accumulate in a food chain<br>**Microbes and disease:**<br>➢ Recall the structure of pathogen and explain how they make you feel unwell<br>➢ Explain the role of white blood cells in the body's immune system<br>➢ Explain how a vaccinations support the immune system<br>**Fit and healthy:**<br>➢ Define what is meant by a 'non-communicable disease'.<br>➢ Explain the effects of smoking, diet and alcohol on health<br>**The human machine:**<br>➢ Describe the structure of the skeletal system<br>➢ Describe how antagonistic pairs of muscles help us do work |

- Recall that aerobic respiration is an exothermic reaction continuously happening in cells. Explain why we respire anaerobically and why this leads to cramps and an oxygen debt.

**Inheritance and selection:**

- Recall inherited characteristics are controlled by genes.
- Compare sexual and a-sexual reproduction
- Explain the process of selective breeding

**Reactions of metals and metal compounds:**

- Describe the properties of metals and non-metals
- Describe the difference between bases and alkalis and recall that they both neutralise acids
- Name salts produced when reacting different acids with different metal compounds

**Patterns of reactivity:**

- Describe how reactivity of the group 1 metals increases as you move down the periodic table
- Predicts products of a displacement reaction based on the metals reactivity
- Explain how reactivity of metals can be used to extract metals from their ores

**Using chemistry:**

- Recall that in reversible reactions one reaction is exothermic and the other is endothermic
- Define the term ‘catalyst’ and explain how they increase the rate of a reaction
- Describe the properties and uses of ceramics, composites and polymers

**Earth and the atmosphere:**

- Describe the structure of the Earth and the carbon cycle
- Explain how man-made gases can alter the balance of the atmosphere and affect climate change
- Define the term ‘finite’ and describe different recycling methods

**Electrical circuits:**

- Explain the difference between series and parallel circuits
- Explain what is meant by the term ‘current’ and ‘voltage.
- Explain the function of a fuse and circuit breaker within an appliance

**Energy and electricity:**

- Define the term ‘power’
- Calculate power using energy and time and current and voltage
- Calculate the efficiency of a device

**Pressure and moments:**

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| | ➢ Recall the equation for calculating pressure and moments<br>➢ Explain how pressure increases with depth in liquids and decreases as you go higher into the atmosphere<br>**Stretching and compressing:**<br>➢ Recall Hooke's law and the equation used to calculate the force applied to a spring<br>➢ Recall how to calculate work done<br>**Energy and waves**<br>➢ Recall the properties of transverse and longitudinal waves<br>➢ Recall how to calculate wave speed<br>➢ Describe what ultrasound waves are and their uses |
| Skills | ➢ Identify random, measurement, systematic and zero errors<br>➢ Evaluate whether an experiment is valid in order to draw a conclusion<br>➢ Calibrate measuring equipment and judge whether the resolution is appropriate |