# Curriculum Map
## Year 7

# Science

### *Learning Aims and Curriculum Intent:*

In Year 7 Science lessons at Forest, students will develop not only scientific knowledge but will an understanding of science as a process. Students will develop the skills in asking questions, developing and using models, planning and carrying out investigations, analysing and interpreting data and using mathematics and computational thinking. They will also begin to develop their skills in constructing explanations, thinking critically, engaging in argument from evidence, and obtaining, evaluating, and communicating information.

| Term | Content, Key Questions and Knowledge | Skills | Assessment |
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| **Michaelmas** | **Introduction to Science**<br><br>The introduction to science serves as a common foundation into secondary school science. Year 7 will be introduced to the importance of safety in every science lesson and will be taught to distinguish between hazards and risks. They will be able to identify, name and draw specialist scientific equipment in order to make measurements and collect different types of data. They will also be introduced to the history of the development of the scientific method before being introduced to a framework that can be used in science lessons to employ the scientific method.<br><br>• Why is it important to work safely in a lab?<br>• How and why do we use Bunsen burners in science lessons?<br>• Why is measurement important in science?<br>• What is the difference between categoric, discrete and continuous data?<br>• What is the scientific method and how was it developed?<br>• What is the scientific method and how can we use to it test a hypothesis?<br><br>**Cells**<br><br>This unit allows students to learn about the basic units of life and levels of organisation. Student are introduced to cell organelles in both animal, plant cells and specialised cells. They are introduced to the microscope and the importance of the microscope as a tool in science to help magnify objects to produce an image that we can see. Students will be introduced to the micrometre, as the most appropriate unit for describing information about the size of cells/organelles. They will develop their understanding of this relationship mathematically through the introduction to the relationship *'actual (object) x magnification = image'* and will use practical examples to explore this relationship quantitatively.<br><br>• How can we tell if something is living, dead or never lived?<br>• Why do we use a microscope?<br>• How can we distinguish between an animal cell and a plant cell?<br>• How can we use a microscope to observe animal and plant cell organelles?<br>• Why are there so many different types of cells in the human body?<br>• How can we use a microscope to work out the size of cell organelles?<br>• How do multicellular organisms have cells organised into tissues, organs and organ systems?<br>• What happens to cells when an onion grows?<br><br>**Forces**<br><br>This unit allows students to be introduced to the nature of forces such as 'pushes or pulls' and the nature of forces as an interaction between two objects. Students will learn the difference between contact and non-contact forces, describing the different types and giving examples of situations involving these forces. Students will then start to link force with motion – Newton's 1st and 2nd laws – identifying the forces acting on a single object and applying the laws to predict its motion. Throughout, students will learn to represent forces using accurate force diagrams. Students will explore the concepts of friction, drag and springs in more detail, including opportunity for scientific enquiry and practical skills development.<br><br>• What is a force?<br>• How can we describe the nature of a force?<br>• How can we describe the motion of an object when the forces acting on it are balanced?<br>• How can we describe the motion of an object when the forces acting on it are unbalanced?<br>• How does friction affect the motion of an object?<br>• How does the mass of an object affect the force needed to start it moving against friction?<br>• How does friction affect the motion of an object?<br>• What happens to a spring when a force acts on it and how can we investigate this? | Observing, describing and recording experimental results, both qualitative and quantitative<br><br>Working safely and following a set of instructions carefully<br><br>Generating a hypothesis from an observation<br><br>Justifying a hypothesis using scientific reasoning<br><br>Identifying hazards and associated risks in the lab<br><br>Identifying independent, dependent and control variables in an experiment<br><br>Drawing an appropriate results table for any given method<br><br>Understanding the difference between categoric, discrete and continuous data and select the most suitable graph for the data being used.<br><br>Drawing a line graph with correct scale, axes, points and smooth line/curve of best fit<br><br>Writing a method to test a hypothesis.<br><br>Identifying anomalies in an experiment.<br><br>Plotting multiple graphs on the same axes and comparing them<br><br>Using your graphs to determine if your hypothesis was correct.<br><br>Drawing a conclusion and justifying it.<br><br>Modelling using particle diagrams.<br><br>UA1.1 Use appropriate apparatus consistently to measure and record (length, area, mass, forces, volume, time, speed, temperature, frequency of organisms, abiotic factors) and explain differences between related measurements (length and extension)<br><br>UA1.2 Examine specimens using a microscope correctly (including identify the parts of a microscope, calculate magnifications, prepare slides)<br><br>MA1.1 Understand that much of science is abstract and cannot be experienced directly. | Introduction to Science is assessed before October half term as an End of topic test.<br><br>Each subsequent topic consists of two formative progress quizzes:1 and 2 with a total of 20 marks each.<br><br>Michaelmas Test |

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| **Lent** | **Particle Model**<br><br>Students will be aware that we are surrounded by matter or 'stuff'. We will introduce different methods of classifying this matter including by identifying them as solids, liquids and gases. Students will describe the properties of solids, liquids and gases that we can see, and will be able to explain them in terms of particles that we can't see. Finally, students will use their knowledge of the particle model to explain different phenomena: diffusion, pressure in gases and Brownian motion.<br><br>• How can we classify materials as solids, liquids and gases?<br>• How can we explain the properties (that we can see) of solids, liquids and gases in terms of particles (that we can't see)?<br>• What happens to the particles when matter changes state?<br>• Why does a solid expand when it is heated?<br>• How do gases move?<br>• Why do particles diffuse?<br>• How is gas pressure created?<br>• How does temperature affect the rate of diffusion?<br><br>**Reproduction**<br><br>In this unit pupils will take their initial learning about levels of organisation to explore the human reproductive system in humans and the importance of reproduction as one of the life processes.<br>They will learn to name and describe the organs of the male and female reproductive systems and consider how the various organs work together to support reproduction. After conception, students will learn how the foetus develops and is supported during pregnancy.<br>Finally, students will learn about the biological changes that take place during puberty and the role of hormones in causing changes to activity of particular organs, and that these changes prepare the body for reproduction.<br><br>• What are gametes?<br>• How does the structure of the male and female reproductive system enable reproduction to take place?<br>• If males produce sperm and females produce eggs, what events take place to cause the sperm and egg to meet and fertilise?<br>• How is the foetus supported as it develops?<br>• How are babies born?<br>• When is the human body ready for reproduction?<br>• How does the menstrual cycle prepare a woman for a possible pregnancy?<br>• How do humans change as they grow?<br><br>**Energy**<br>Students will be introduced to the concept of energy stores and energy transfers. Emphasis will be placed on explaining that energy is an abstract mathematical concept, and we have to use models to try and gain an understanding of energy. The emphasis on describing energy in terms of stores and transfers will begin in Y7. The principle of conservation of energy will be introduced, and students will learn that no transfer is completely efficient, some energy is always transferred to the thermal store. The remaining topic will focus on the process of energy transfer by heating as this provides an opportunity to link back to and extend understanding of the particle model.<br><br>• Energy is an abstract mathematical concept! So how can we start to describe energy in the correct scientific way?<br>• What are energy carriers?<br>• Energy transfers always transfer some energy to the thermal store (not useful!) How can we reduce this to make energy transfers more efficient?<br>• What is the difference between energy (in a thermal store), heating and temperature?<br>• How can we explain heating and cooling?<br>• How can energy be transferred by heating? (conduction)<br>• How can energy be transferred by heating? (convection)<br>• Why do penguins huddle in the arctic winter storms? | | |

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| **Trinity** | **Atoms and Elements**<br><br>Students start to extend their thinking about particles by thinking about a different way of classifying materials. In this topic, students will learn about the element as one type of material in which all the atoms are the same. Students will identify elements from particle diagrams simply by identifying those diagrams that represent all the particles as being the same. Students will learn about the history of the discovery of the Periodic Table and will be able to describe how it is organised.<br>Students will learn that, while all the atoms in an element are the same, the atoms of carbon are different from the atoms of gold, by using information from the Periodic Table to identify number of protons, electrons and neutrons and distinguish elements in this way.<br><br>• Of all the materials around us, only around 100 are elements. What then is an element?<br>• How are why are the elements arranged in the Period Table?<br>• How do the modern Periodic Table come to be?<br>• How are the atoms of carbon different from the atoms of copper?<br>• How can we describe the arrangement of electrons in an atom?<br>• Why are the Group 1 metals so reactive (and why do they get more reactive as you go down the group)?<br><br>**Ecosystems**<br><br>Students will build on the ideas they have previously covered in Primary School and will link this with the new Biological knowledge that they have gained this year. This includes looking at how species are adapted to their environment, how ecosystems differ and how species within an ecosystem are interconnected.<br><br>• Ecosystems<br>• Food chains and webs<br>• Water flea temperature and heart rate investigation<br>• Adaptations | | |

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| **Examples of Homework** | Worksheets, presentations, research skills. Writing up practical experiments. Projects such as cell structure modelling or presentations about a certain element. | |
| **Key terminology** | Hypothesis, conclusion, evaluation, hazard, risk, | |
| **Super-curricular enrichment and scholarly extension** | **Super curricular Activities:**<br>Join science clubs or societies: Join STEAM society or Astronomy Club.<br><br>**Books:**<br>"Chemical Reactions" by Avi Reisman<br>"The Science Book: Big Ideas Simply Explained" by DK<br>"A Short History of Nearly Everything" by Bill Bryson (covers various scientific topics)<br>"Microbes: Discover an Unseen World" by Nicola Davies<br><br>**Documentaries:**<br>"The Mystery of Matter: Search for the Elements" (PBS series)<br>"The Farthest: Voyager in Space"<br>"The Power of Plants" (BBC documentary)<br>"How the Universe Works" (Discovery Channel series)<br><br>**Places to Visit in London:**<br>**Science Museum:** Explore exhibits on electricity, magnetism, space, and microbes. Attend interactive shows and demonstrations.<br>**Natural History Museum:** Discover exhibits on the evolution of life, biodiversity, and the interconnectedness of ecosystems.<br>**Royal Observatory Greenwich:** Learn about space, astronomy, and the history of navigation. Visit the Planetarium for a cosmic experience.<br>**Kew Gardens:** Discover the role of plants in photosynthesis and explore the diverse plant species.<br>**London Zoo:** Explore the animal kingdom and learn about the role of microbes in animal health. | |
| **Useful websites** | **Here are some useful websites that can complement the topics covered in year 8 science:**<br><br>**Royal Society of Chemistry (RSC) Education:** The RSC Education website provides resources, experiments, and interactive activities related to chemical reactions, elements, compounds, acids, and bases. https://edu.rsc.org/<br>**NASA's Students' Corner:** NASA's website offers educational resources, games, and activities for students interested in space and astronomy. Explore topics such as the solar system, space missions, and more. https://www.nasa.gov/students<br>**Khan Academy:** Khan Academy offers free educational videos, tutorials, and quizzes on a wide range of science topics, including electricity, magnetism, light, and more. https://www.khanacademy.org/<br>**Electricity and magnetism:** https://www.furryelephant.com/content/electricity/voltage-current/<br><br>**BBC Bitesize:** BBC Bitesize provides interactive learning resources, articles, and quizzes for various subjects, including science. Their science section covers topics like chemical reactions, microbes, and space. https://www.bbc.co.uk/bitesize/subjects/zng4d2p<br>**National Geographic Kids:** National Geographic Kids website offers articles, videos, and games on science, nature, and the environment. You can find information on topics like ecosystems, animals, and photosynthesis. https://www.natgeokids.com/uk/<br>**Exploratorium:** The Exploratorium website provides interactive online exhibits, activities, and videos on various science topics, including electricity, magnetism, and light. https://www.exploratorium.edu/explore | |
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