

Long Term Plan: Year 7

“Science is simply the word we use to describe a method of organising our curiosity.”

The programme for years 7 – 11 has staff teaching a single class, with rotating topics/subjects. There is varied order of topics for classes to allow for the rotation of practical equipment. Students will complete a biology, chemistry and then physics topic followed by an assessment. This process will then repeat again.

Staff are to use the [Curriculum Road Map](#) in the Science Drive to ensure that they rotate at the appropriate times.

Topic	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers
One	Scientific Skills	Introduction to practical work at ASA Short series of lessons to embed the requirements of the practical aspects of our programmes Complete the GL Assessment	Naming & drawing equipment Introduction to health & safety in the laboratory Writing Methods Recording Observations Bunsen Burner Licence	Names of equipment Students attempting to draw in 3D	Students will have used very basic equipment at KS2	All our course programmes depend upon this knowledge	Introduction of variables & values Accuracy & validity of results
SMSC & British Values	Working cooperatively Working safely in a laboratory setting						
Cultural Capital	Scientist throughout history						
Career Link	Any science based career will utilise these skills						

Two	Forces I	<p>Speed</p> <p>Investigate the variables that affect the speed of a toy rolling down a slope</p> <p>Gravity</p> <p>Explain the way in which an astronaut's weight varies on a journey to the Moon</p>	<p>Carrying out practical work</p> <p>Recording and interpreting results</p> <p>Drawing graphs and using these to generate conclusions</p> <p>Calculations</p>	<p>Moon has no gravity</p> <p>Not recognising all forces as they are not always seen</p> <p>Gravity holds planets in orbit</p>	<p>Basic forces will have been covered at KS2. Students should know about gravity & speed</p>	<p>This information leads into forces 2 topic in Y8 and the forces unit studied at GCSE</p>	<p>Predict changes in speed when forces change</p> <p>Calculate gradients to graphs</p> <p>Changing the subject of equations to calculate a desired amount</p>
SMSC & British Values	History of space travel Man's visit to the Moon						
Cultural Capital	Space missions & the complexity of getting Humans into space/living in space in the future						
Career Link	This is a fundamental physics concept that links to many STEM career opportunities						
Three	Matter I	<p>Particle model</p> <p>Relate the features of the particle model to the properties of materials in different states</p> <p>Separating Mixtures</p> <p>Devise ways to separate mixtures based on their properties</p>	<p>Use a ball model to explain the difference in properties of the states of matter</p> <p>Accurately draw and label scientific equipment</p> <p>Design and carry out experiments to separate mixtures</p> <p>Use evidence from chromatograms to identify the components in a mixture</p> <p>Construct and use graphical information to draw conclusions</p>	<p>Not all students will know that mixtures display a range of melting and temperatures rather than a fixed point</p> <p>Density is the same as mass</p>	<p>Students should know examples of solids, liquids and gases from KS2 and should be able to explain these in terms of particle location.</p> <p>They will also be aware of the terms associated with changing state.</p>	<p>This information leads into matter 2 topic in Y8 and the particle model of matter unit studied at GCSE</p>	<p>Produce an explanation for semi solids and plasma</p> <p>Explain why glass is a liquid and not a solid</p> <p>Suggest method steps for separating a complex mixture of more than 2 components</p>

SMSC & British Values	Working collaboratively on practical tasks						
Cultural Capital	How distillation and desalination can be used to support the demand for fresh water in areas of the globe that have little/no rain fall each year Use of chromatography in forensic analysis						
Career Link	This is a fundamental chemistry concept that links to many STEM career opportunities						
Four	Organisms 1	<p>Movement</p> <p>Explore how the skeletal system and muscular system in a chicken wing work together to cause movement</p> <p>Cells</p> <p>Identify the principal features of a cheek cell and describe their function</p>	<p>Build an arm activity</p> <p>Microscopy – preparing own slides and viewing more detailed manufactured ones</p> <p>Draw and label accurate scientific diagrams</p> <p>Opportunity for independent research, summarizing of information and extended writing</p>	<p>All cells look the same</p> <p>Only one muscle is needed to move a limb</p>	<p>At KS2 students will have learnt about the human body and the basics of keeping it healthy</p>	<p>This information leads into organisms 2 topic in Y8 and the cells unit studied at GCSE</p>	<p>Link the concepts of energy and forces to the movement of the arm</p> <p>Predict how the failure of one organ/organ system would affect the rest of the body</p>
SMSC & British Values	How do drugs affect the body both short & long term Reasons to keep a healthy body and mind						
Cultural Capital	Investigate the historical and latest developments in prosthetic limbs Review how medical treatments work based on cells, tissues, organs & systems – both historical and the latest developments						
Career Link	This is a fundamental biology concept that links to many STEM career opportunities						
Five	Electromagnets 1	<p>Voltage & Resistance</p> <p>Compare the voltage drop</p>	<p>Draw circuit symbols and use these to generate series and parallel circuit diagrams</p>	<p>Students may not know about electrons yet and will have limited understanding of how</p>	<p>Students should know about series and parallel circuits</p>	<p>This information leads into electromagnets</p>	<p>Predict the effect of changing a battery rating on the</p>

		<p>across resistors connected in series in a circuit</p> <p>Current</p> <p>Compare & explain current flow in different parts of a parallel circuit</p> <p>Concept of electrical fields</p>	<p>Safely carry out practical tasks</p> <p>Calculations related to resistance</p> <p>Generate simple models to explain electricity</p>	<p>current moves through a circuit.</p> <p>Students may mis-understand concepts such as electrical fields and electrostatic forces as these cannot be seen</p>	<p>and should be able to draw basic symbols from KS2</p>	<p>2 topic in Y8 and the magnetism unit studied at GCSE</p>	<p>components in the circuit.</p> <p>Suggest safety issues on reviewing data on circuits</p> <p>Evaluate varied models used to demonstrate what happens in an electric circuit</p>
SMSC & British Values	Use of series & parallel circuits in everyday life situations						
Cultural Capital	Personal safety when using electrical appliances to reduce the risk of electrostatic shock						
Career Link	This is a fundamental physics concept that links to many STEM career opportunities						
Six	Waves I	<p>Sound</p> <p>Relate changes in the shape of an oscilloscope trace to changes in pitch and volume</p> <p>Light</p> <p>Use ray diagrams to model how light passes through some lenses and transparent materials</p>	<p>Conduct practical work and deduce conclusions from the generated results</p> <p>Draw waves that show the difference in pitch and volume of varied notes</p> <p>Construct clear ray diagrams to show the path of light when reflected or refracted</p>	<p>Sound does not travel through a vacuum</p>	<p>Students have done some experiments on sound and light at KS2</p>	<p>This information leads into waves 2 topic in Y8 and the Waves unit studied at GCSE</p>	<p>Compare the waves forms from varied musical instruments</p> <p>Use ray diagrams to show the effect of multiple mirrors within one device</p> <p>Build a periscope</p>
SMSC & British Values	<p>Investigate how lenses can be used to correct vision</p> <p>Effects of various ear problems on the ability to hear</p> <p>How do solar & lunar eclipses form?</p>						
Cultural	Health aspects of light and sound – example in terms of protecting our senses from bright lights (the Sun) or very loud noises						

I Capital	How do the environments of different animals affect the structure of the ears/eyes						
Career Link	This is a fundamental physics concept that links to many STEM career opportunities						
Severn	Ecosystems 1	<p>Interdependence</p> <p>Use a model to investigate the impact of changes in a population of one organism on others in an ecosystem</p> <p>Plant Reproduction</p> <p>Use models to evaluate the features of various types of seed dispersal</p>	<p>Generate food chains and webs</p> <p>Flower dissection</p> <p>Plan a full investigation and carry out suitable reading to produce valid and reproducible evidence</p>	A food chain shows what is eaten by what	At KS2 students will have looked at inter-relationships with food chains and webs. They should have a basic understanding of the structure of a flower	This information leads into ecosystems 2 topic in Y8 and the Ecology unit studied at GCSE	<p>Develop an argument about how toxic substances can accumulate in human food and how to prevent this happening</p> <p>Investigate how selective breeding is used in farming</p>
SMSC & British Values	Ethics linked to genetic engineering & manipulation						
Cultural Capital	Use of selective breeding in farming (arable and livestock) as well as in pets – particularly dogs (this can be tracked historically from Charles II for example)						
Career Link	This is a fundamental biology concept that links to many STEM career opportunities						
Eight	Energy 1	<p>Energy Costs</p> <p>Compare the running costs of fluorescent and filament light bulbs</p> <p>Energy Transfer</p> <p>Explain the energy transfers in a hand-crank torch</p>	<p>Calculations based on the power use of appliances – to establish the running cost of a home</p> <p>Research skills & the use of summarising of information</p> <p>Handling data in the form of tables, charts and graphs</p> <p>Extended writing – renewable & non-</p>	<p>Concepts of energy stores and transfer of energy from store to store</p> <p>Light is a form of radiation transfer and is not a store of energy <i>et al</i></p> <p>Energy is used up</p>	Students should know some examples of renewable and non-renewable energy sources from KS2	This information leads into energy 2 topic in Y8 and the Energy unit studied at GCSE	<p>Suggest ways (using reasoning) to reduce energy bills</p> <p>Suggest why a bouncing ball or swinging pendulum will eventually come to rest</p>

			renewable fuels Practical work to establish the transfer of energy in a range of real-life examples				
SMSC & British Values	Advantages & Disadvantages of renewable & non-renewable energy (Social, economic & environmental consequences)						
Cultural Capital	Discussion opportunity around current/recent energy crisis & impact on local/global economy Need for the development of further sources of renewable energy						
Career Link	This is a fundamental physics concept that links to many STEM career opportunities						
Nine	Reactions 1	Metals & non-metals Use experimental results to suggest an order of reactivity of various metals Acids & Alkalis (Bases) Devise an enquiry to compare how well indigestion remedies work	Plan a full investigation and carry this out in order to prove a hypothesis Construct word and balanced symbol equations to represent chemical reactions Use particle diagrams to show what happens at oxidation and reduction Use a scale to inform predictions	Soap and bleach are acidic Only iron & iron products are magnetic All metals "rust"	Students will have carried out some basic experiments on acids and alkalis at KS2 and should know some indicators	This information leads into reactions 2 topic in Y8 and the chemical changes unit studied at GCSE	Justify the use of specific metals for particular uses Link the concept of pH and concentration to the safety issues of working with acids and alkalis
SMSC & British Values	Names of acids and alkalis from everyday use Safety implications of working with chemicals						
Cultural Capital	Investigate how to treat a sting caused by bees, wasps & jelly fish Research the most deadly stings/bites/poisons from plants and animals across the world						
Career Link	This is a fundamental chemistry concept that links to many STEM career opportunities						

Ten	Genes I	Variation Use graphical data relating to variation and explain how it may lead to the survival of a species Human Reproduction Relate advice to pregnant women to ideas about transfer of substances to the embryo	Handling data in the form of tables, charts and graphs Extended writing opportunities Produce accurately labelled diagrams to show complex scientific processes Use of manufactured models to show fetal development	Students will have many misconceptions surrounding the human reproduction aspects of this topic	At KS2 students will have carried out some basic investigations into plants/animals and their habitats	This information leads into genes 2 topic in Y8 and the ecology and inheritance units studied at GCSE	Predict the implications of a change in environment on a population
SMSC & British Values	Impact of changing global environment on habitats and living organisms – e.g coral reef Should we be spending lot so of money trying to make the trip to the Moon easier or should we be focused on finding out about our planet and ways to protect it? Impact on mother and fetal health of taking drugs, alcohol and cigarettes while pregnant Understanding of the science behind puberty and reproduction						
Cultural Capital	Research the current global extinction crisis for both plant and animal species. What are places like Edinburgh Zoo doing to support animals facing extinction?						
Career Link	This is a fundamental biology concept that links to many STEM career opportunities						
Eleven	Earth I	Earth Structure Model the processes that are responsible for rock formation and link these to rock features Universe Relate observations of changing day length to an appropriate model of the solar system	Collaborative research and summarising of information Practical activity looking at rock formation and weathering Use of observational data relating to the Solar system and Universe to generate a sense of scale and to establish patterns	All rock formed at the same time Students will need a concrete model to support in understanding how seasons occur	Students will have learnt about rocks, the Earth and the Universe at KS2	This information leads into earth 2 topic in Y8 and the space unit studied in GCSE Physics.	Investigate the conditions needed for life to exist on other planets – do any planetary bodies fit these criteria? Use shadows to generate an accurate timepiece
SMSC & British	Link to other communities for differing beliefs in the formation of Earth/Life on Earth Fossil evidence for the evolution of life on Earth Geocentric V Heliocentric Universe						

Values	
Cultural Capital	Impact on people/habitats of the shifting continental plates – earthquakes, volcanoes, tsunamis, weather issues etc Development of telescopes over time & how this has changed what we know about our Universe SETI Space travel & interplanetary living
Career Link	This is a fundamental topic that links to many STEM career opportunities

Enquiry processes: working scientifically

Analyse

- Analyse patterns
- Discuss limitations
- Draw conclusions
- Present data



Communicate

- Communicate ideas
- Construct explanations
- Critique claims
- Justify opinions



Enquire

- Collect data
- Devise questions
- Plan variables
- Test hypotheses



Solve

- Estimate risks
- Examine consequences
- Review theories
- Interrogate sources

