KS3 SCIENCE OVERVIEW

Atoms and The Periodic Table	MAGNETS AND ELECTRICITY

AUTUMN TERM		SPRING TERM	
LESSON TITLE	**WORKING SCIENTIFICALLY**	**LESSON TITLE**	**N.C. AIMS**
Atoms and Elements To understand the difference between atoms and elements.	Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas.	**Introduction to Circuits** To understand why some circuits fail to work.	Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as a flow of charge.
Compounds To understand the difference between elements, compounds and mixtures.	Make and record observations and measurements using a range of methods for different investigations.	**Modelling Circuits** To use an analogy to explain how electrical circuits work.	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**.**
The Periodic Table To understand the principles underpinning the Mendeleev periodic Table	Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas. Make predictions using scientific knowledge and understanding. Interpret observations and data,	**Measuring Voltage** To investigate the best citrus fruit to make a battery from.	Present observations and data using appropriate methods, including tables and graphs. Make and record observations and measurements using a range of methods for different investigations, and evaluate the reliability of methods and suggest

	including identifying patterns and using observations, measurements and data to draw conclusions		possible improvements.
Metals and Non-Metals To understand the difference between a metal and a non-metal	Make predictions using scientific knowledge and understanding. Use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety. Make and record observations and measurements using a range of methods for different investigations. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions	**Series Circuits** To investigate current in series circuits.	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. Make predictions using scientific knowledge and understanding.
The Alkali Metals To understand that there are patterns in the properties of the alkali metals.	Make predictions using scientific knowledge and understanding. Make and record observations and measurements using a range of methods for different investigations. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.	**Parallel Circuits** To investigate current in parallel circuits.	Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. Make predictions using scientific knowledge and understanding
The Halogens To understand that there are patterns in the properties of the halogens.	Make predictions using scientific knowledge and understanding. Use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety. Make and record observations and measurements using a range of	**Resistance** To investigate resistance in circuits.	Differences in resistance between conducting and insulating components (quantitative).

	methods for different investigations. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.		
The Noble Gases To understand that there are patterns in the properties of the noble gases.	Make predictions using scientific knowledge and understanding. Present observations and data using appropriate methods, including tables and graphs. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions	**Magnets** To investigate magnets.	Magnetic pole attraction and repulsion. Drawing magnetic field lines by plotting with a compass. The idea of electric field forces acting across space between objects, not in contact.
ASSESSMENT OF LEARNING: END OF UNIT TEST + CHECK YOUR PROGRESS + END OF CHAPTER QUESTIONS		**Making Electromagnets** To construct an electromagnet.	The magnetic effect of a current, electromagnets, DC motors (principles only).
		Static Electricity To investigate static electricity.	Separation of positive or negative charges when objects are rubbed together: Transfer of electrons, forces between charged objects.
		ASSESSMENT OF LEARNING: END OF UNIT TEST + CHECK YOUR PROGRESS + END OF CHAPTER QUESTIONS	

Northstar New School

SPACE	Eating, Drinking and Breathing

SUMMER TERM		SUMMER TERM	
LESSON TITLE	**OVERARCHING OBJECTIVES**	**LESSON TITLE**	**OVERARCHING OBJECTIVES**
Space and the Solar System To explore space and the solar system.	This is lesson 1 in a series of lessons that covers the topic of KS3 Space. This lesson focuses on the planets and where they lie in our Solar System. You can teach this lesson as a stand-alone lesson or use it to form the wider unit of work on space.	**Exploring a healthy diet**	Content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed
Investigating Gravity, Mass and Weight To understand gravity, mass and weight.	Explore the concepts of gravity, mass and weight. Students will look at what gravity, mass and weight are and then relate these to the different planets in our Solar System. Students carry out practical investigation looking at how different masses affect the surface of a planet when they collide.	**Testing foods**	Test foods for starch, sugars, protein and fat; predict the results of food tests for a range of foods; evaluate the risks involved in carrying out food tests. (investigation)

Mars Rover To design and evaluate a Mars rover. (2 lessons)	Students will learn about Mars rovers, including Curiosity which is currently exploring the surface of Mars. They will learn about the goals of the Perseverance rover which lands on Mars in February 2021. Students will explore the equipment needed on a rover and will then design their own rover and build a prototype to test and evaluate.	**Comparing energy needs**	Calculations of energy requirements in a healthy daily diet Comparing energy values of different foods (from labels) (kJ)
Colonising Mars To explore whether we could live on Mars.	Can we colonize Mars?	**Exploring obesity and starvation**	The consequences of imbalances in the diet including obesity, starvation and deficiency diseases
Orbits To explain how objects travel in an orbit.	This lesson introduces students to orbits and explores the objects that might be in orbit. Students investigate the relationship between the radius of an orbit and the time taken for the orbit, which provides an ideal chance for them to work scientifically.	**Understanding deficiency diseases**	Identify the causes and effects of some deficiencies in the diet; suggest which foods could prevent well- known deficiencies; plan ways of communicating ideas about preventing deficiency diseases.
		Understanding the human digestive system	The tissues and organs of the digestive system, including adaptations to function
		Investigating the start of digestion	The tissues and organs of the digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
		Understanding the roles of the digestive system	The tissues and organs of the digestive system, including adaptations to function

		Applying key ideas	Differentiated task to test application of ideas.
		Introducing enzymes	How the digestive system digests food (enzymes simply as biological catalysts)
		Recognising the role of bacteria	The importance of bacteria in the human digestive system
		Understanding how we breathe	The mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases
		Measuring breathing	The mechanism of breathing to move air in and out of the lungs, including simple measurements of lung volume
ASSESSMENT OF LEARNING: END OF UNIT TEST + CHECK YOUR PROGRESS + END OF CHAPTER QUESTIONS		**Evaluating gas exchange in humans**	The structure and functions of the gas exchange system in humans, including adaptations to function
		Investigating diffusion	The structure and functions of the gas exchange system in humans, including adaptations to function Diffusion in liquids and gases driven by differences in concentration Diffusion in terms of the particle model
		Exploring the effects of disease and lifestyle	The impact of exercise, asthma and smoking on the human gas exchange system
		ASSESSMENT OF LEARNING: END OF UNIT TEST + CHECK YOUR PROGRESS + END OF CHAPTER QUESTIONS	

Elements, Compounds and Reactions	Energy Transfers and Sound

SUMMER TERM		SUMMER TERM	
LESSON TITLE	**OVERARCHING OBJECTIVES**	**LESSON TITLE**	**OVERARCHING OBJECTIVES**
Finding elements and building the Periodic Table	Chemical symbols and formulas for elements and compounds	**Exploring energy transfers**	Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, burning fuels Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change
Looking at the Periodic Table of elements	The principles underpinning the Mendeleev Periodic Table The Periodic Table: periods and groups; metals and non- metals	**Understanding potential energy and kinetic energy**	Other processes that involve energy transfer: changing motion, dropping an object
Understanding elements and atoms	Differences between atoms, elements and compounds Chemical symbols and formulae for elements and compounds	**Doing work**	Work done; simple machines give bigger force but at the expense of smaller movement (and vice versa): product of force and displacement unchanged
Understanding metals	The varying physical and chemical properties of different elements	**Looking at dynamos**	Other processes that involve energy transfer: changing motion,

	The properties of metals and non-metals		completing an electrical circuit
Understanding non-metals	The varying physical and chemical properties of different elements The properties of metals and non-metals	**Understanding elastic potential energy**	Other processes that involve energy transfer: stretching a spring. Work done and energy changes on deformation Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in elastic distortions
Identifying metalloids	The varying physical and chemical properties of different elements	**Knowing the difference between heat and temperature**	Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with temperatures
Discovering the origin of metals	The varying physical and chemical properties of different elements The properties of metals and non-metals Chemical symbols and formulae for elements and compounds	**Thinking about fuels**	Fuels and energy resources; other processes that involve energy transfer: burning fuels, metabolism of food
Choosing elements for a purpose	The varying physical and chemical properties of different elements	**Investigating fuels**	Fuels and energy resources; other processes that involve energy transfer: burning fuels Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy in

			chemical compositions
Applying key ideas	Extract ideas about tin or other elements from the text, including earlier sections of the chapter; apply ideas about the properties of tin to explain some of its applications; use ideas and information about elements, compounds and formulas to explain the properties of chemicals	**Applying key ideas**	Energy Changes – making electricity
Combining elements	Differences between atoms, elements and compounds Chemical symbols and	**Exploring sound**	Sound produced by vibrations of objects; sound waves are longitudinal
Using models to understand chemistry	Use a simple model to show the differences between atoms and molecules; use models to represent compounds	**Describing sound**	Sound produced by vibrations of objects, in loudspeakers; detected by their effect on microphone diaphragm and the ear drum
Understanding what happens when an element burns	Chemical reactions as the rearrangement of atoms Representing chemical reactions using formulae and using equations Combustion	**Measuring the speed of sound**	Echoes; the speed of sound in air
Observing how elements react in different ways	The varying physical and chemical properties of different elements Representing chemical reactions using formulae and using equations The chemical properties of metal and non-metal oxides with respect to acidity	**Understanding how sounds travels through materials**	Sound needs a medium to travel; the speed of sound in air, in water, in solids
Identifying the special features of carbon	The varying physical and chemical properties of different elements	**Learning about the reflection and absorption of sound**	Echoes, reflection and absorption of sound

			May be reduced in scope
Understanding oxidation	Representing chemical reactions using formulae and using equations Oxidation	**Hearing sounds**	Sound produced by vibrations of objects, detected by their effects on microphone diaphragm and the ear drum Waves transferring information for conversion to electrical signals by microphone
Investigating carbonates	Conservation of mass changes of state and chemical reactions Combustion, thermal decomposition, oxidation Chemical symbols and formulae for elements and compounds Thermal decomposition	**Understanding factors affecting hearing**	Auditory range of humans and animals
Explaining changes	Differences between atoms, elements and compounds Chemical symbols and formulae for elements and compounds Conservation of mass changes of state and chemical reactions Chemical reactions as the rearrangement of atoms Thermal decomposition, oxidation	**Finding out about sounds we cannot hear**	Auditory range of humans and animals
ASSESSMENT OF LEARNING: END OF UNIT TEST + CHECK YOUR PROGRESS + END OF CHAPTER QUESTIONS			

Intent:

At Northstar New School, Science should be fully inclusive to every child. Our aims are to fulfil the requirements of the National Curriculum for Science; providing a broad, balanced and differentiated curriculum; ensuring the progressive development of knowledge, skills and vocabulary and for the children to develop a love of Science. Furthermore, we aim to inspire in pupils a curiosity and fascination about the natural and man-made world and a respect for the environment that will remain with them for the rest of their lives. This include the lesson they complete in the classroom but also the other experiences they are offered, such as educational visits, residentials and enrichment days.

The aims of teaching Science in our school are to:

- Equip children to use themselves as starting points for learning about Science, and to build on their enthusiasm and natural sense of wonder about the world
- Develop through practical work the skills of observation, prediction, investigation, interpretation, communication, questioning and hypothesizing, and increased use of precise measurement skills and ICT
- Encourage and enable pupils to offer their own suggestions, and to be creative in their approach to science, devising their own invitations and taking lines of enquiry in a way that interests them
- Gain enjoyment from their scientific work
- Enable children to develop their skills of co-operation through working with others, and to encourage where possible, ways for children to explore science in forms which are relevant and meaningful to them
- Teach scientific enquiry through contexts taken from the National Curriculum for science
- Encourage children to collect relevant evidence and to question outcome and to build resilience to persevere as it is likely they will need to repeat results or will encounter unexpected results that do not support their hypothesis
- Encourage children to treat the living and non-living environment with respect and sensitivity
- Stress the need for personal and group safety by the correct usage and storage of resources
- To critically question the world around them
- To enable children to appreciate that we do not always know the answers when carrying out scientific enquiry as the world around them is continually changing and developing
- Equip children with the language to be able to discuss their learning and confidently explain their scientific understanding in small groups

Special Educational Needs Disability (SEND) / Pupil Premium / Higher Attainers

Children may have work additional to and different from their peers in order to access the curriculum dependent upon their needs. As well as this, our school offers a demanding and varied curriculum, providing children with a range of opportunities in order for them to reach their full potential and consistently achieve highly from their starting points.

Implementation:

To ensure high standards of teaching and learning in science, we implement a curriculum that is progressive throughout the whole school. Science is taught in discrete lessons for at least 1 hour in Key Stage 2 and Key Stage 3. We ensure that teachers have the same expectations during science lessons that they would have when teaching English or Mathematics and that any mathematical task (such as measuring or drawing graphs) is pitched at an age-appropriate level to ensure sufficient challenge. It is vital that any mathematical or English barriers should not impede a child's scientific learning, thus meaning dialogic learning is a central part to our Science teaching.

The Science curriculum at NNS is based upon the 2014 Primary National Curriculum in England, which provides a broad framework and outlines the knowledge and skills taught in each Key Stage. Teachers plan lessons for their class using our progression of knowledge and skills document, which incorporates Working Scientifically. When teaching Science, teachers should follow the children's interests to ensure their learning is engaging, broad and balanced. Before planning a unit of work, teachers should assess children's prior knowledge and understanding to ensure work is pitched at the correct level. A variety of teaching approaches are used based on the teacher's judgement. Teaching key subject specific vocabulary is also a key part out science curriculum. The vocabulary children will need for that unit are identified on the school's progression document and this builds upon the vocabulary they have learnt in earlier years. The key vocabulary will be identified in the vocabulary dozen on the children's knowledge organisers.

Science assessment is based on teacher's assessment of children. This is then reported on the school's assessment document and the percentage of children working at, above and below the expected standard are identified. At the end of a unit, teachers will identify if a child is working at the expected standard for that objective.

Science provides excellent opportunities to enhance the learning of more able pupils through planning lines of enquiry, asking opened ended problems, analysing results and drawing conclusions based on scientific findings.

At Northstar New School, we provide a variety of opportunities for Science learning inside and outside the classroom. Learning outside of the classroom setting, is an essential part to learning Science. It is essential children observe and immerse themselves in their local environment to apply their learning practically to real-life situations.

Impact:

Within science, we strive to create a supportive and collaborative ethos for learning by providing opportunities for children to question and investigate to discover answers for themselves and take their learning in a direction they are interested in.

Our science curriculum is well thought out and is planned to demonstrate progression. We focus on progression of knowledge and skills and discreet vocabulary progression also form part of the units of work.

We measure the impact of our curriculum through the following methods:

- Assessing children's understanding of topic linked vocabulary before and after the unit is taught
- Marking of written work in books
- Using dialogic learning tasks to assess children's understanding
- Summative assessment of pupil discussions about their learning.
- Images and videos of the children's practical learning.
- Interviewing the pupils about their learning (pupil voice)
- Moderation staff meetings where pupil's books are scrutinised and there is the opportunity for a dialogue between teachers to understand their class's work
- External moderation of children's work at the end of each Key Stage
- Annual reporting of standards across the curriculum to parents

The SLT will continually monitor the impact the teaching of science is having on the children's learning through book scrutinises to ensure the progress of knowledge and skills are being taught. They will also ensure the knowledge taught is retained by the children and continually revisited and that the learners are able to apply the skills they have been taught to a variety of different settings, showing independence with their learning.