



Northstar New School – Curriculum Overview -Science KS2

Science

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, residential 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 double sessions for 1 hour and 15 minutes 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 of 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 scrutinies and lesson observations to ensure the progress of knowledge and skills is 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.

We follow the new National Curriculum when delivering our Science lessons. In Years 5 and 6, this means that we are using the Upper KS2 programme of study, where pupils are taught to use practical scientific methods, processes and skills. They plan different types of scientific enquiries to answer questions, they make predictions, they take measurements using a range of scientific equipment and they record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

SCIENCE – YEAR 3 2022-23	
AUTUMN TERM	
<p>Pupils will have the opportunity to develop the following skills; Working scientifically:</p> <ul style="list-style-type: none"> • ask relevant questions and use different types of scientific enquiries to answer them. • set up simple practical investigations, compare things and make fair tests. • make organised and careful observations and take accurate measurements using the right units using a range of equipment including thermometers and data loggers. • gather, record, sort and present data in a variety of ways to help in answering questions. • record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. • report findings from investigations, including explaining by talking and writing about them, displaying or presenting results and conclusions. 	<p>Pupils will have the opportunity to develop their knowledge about:</p> <p>ROCKS</p> <ul style="list-style-type: none"> • compare different types of rocks • make systematic and careful observations • group rocks based on their properties • explain how fossils are formed • explain Mary Anning’s contribution to palaeontology. • explain how soil is formed <p>Animals including humans</p> <ul style="list-style-type: none"> • sort foods into food groups and find out about the nutrients that different foods provide • explore the nutritional values of different foods by gathering information from food labels • sort animal skeletons into groups, discussing patterns and similarities and differences. • investigate an idea about how the human skeleton supports movement. • explain how bones and muscles work together to create movement • design and carry out my own investigation.

<p>SPRING TERM</p>	
<p>Working scientifically – pupils will have the opportunity to develop the following skills:</p> <ul style="list-style-type: none"> • ask relevant questions and use different types of scientific enquiries to answer them. • set up simple practical investigations, compare things and make fair tests. • make organised and careful observations and take accurate measurements using the right units using a range of equipment including thermometers and data loggers. • gather, record, sort and present data in a variety of ways to help in answering questions. • record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. • report findings from investigations, including explaining by talking and writing about them, displaying or presenting results and conclusions 	<p>Forces and Magnets - pupils will have the opportunity to develop their knowledge about:</p> <ul style="list-style-type: none"> • identify the forces acting on objects • Investigate how a toy car moves over different surfaces. • sort magnetic and non-magnetic materials • investigate the strength of magnets. • explore magnetic poles. • observe how magnets attract some materials <p>Light</p> <ul style="list-style-type: none"> • recognise that I need light to see things, and that dark is the absence of light. • investigate which surfaces reflect light. • use a mirror to reflect light and explain how mirrors work. • know that light from the sun can be dangerous and that there are ways we can protect our eyes. • investigate which materials block light to form shadows. • find patterns when investigating how shadows change size.
<p>SUMMER TERM</p>	
<p>Working scientifically – pupils will have the opportunity to develop the following skills:</p> <p>ask relevant questions and use different types of scientific enquiries to answer them.</p> <p>set up simple practical investigations, compare things and make fair tests.</p> <p>make organised and careful observations and take accurate measurements using the right units using a range of equipment including thermometers and data loggers.</p> <p>gather, record, sort and present data in a variety of ways to help in answering questions.</p> <p>record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.</p>	<p>Plants</p> <ul style="list-style-type: none"> • Pupils will have the opportunity to develop their knowledge of: • name the different parts of flowering plants and explain their jobs. • set up an investigation to find out what plants need to grow well • record my observations • present the results of my investigation using scientific language. • investigate how water is transported in plants • name the different parts of a flower and explain their role in pollination and fertilisation • understand and order the stages of the life cycle of a flowering plant.

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SCIENCE – YEAR 4 2022-23	
AUTUMN TERM	
<p>Pupils will have the opportunity to develop the following skills; Working scientifically: (Electricity)</p> <ul style="list-style-type: none"> • Children can group and classify things (appliances) and record their findings using labelled diagrams. • Children can use a range of (electrical) equipment and record findings using labelled diagrams. • Children can make predictions, use a range of (electrical) equipment and draw simple conclusions from their results. • With some guidance, children can decide how to set up a simple practical enquiry, make predictions and draw simple conclusions from their results. • Children can report and present their results and conclusions to others in oral forms. • Children can use straightforward scientific evidence to answer questions and identify similarities, differences, patterns and changes relating to simple scientific ideas and processes. <p>Working scientifically: (Animals Including Humans)</p> <ul style="list-style-type: none"> • Distinguishing between scientific and non-scientific questions and choosing between types of scientific enquiry. • setting up an enquiry or test to understand what causes tooth decay • by observing the changes that occur in their enquiry or test. • presenting findings, making predictions and raising questions about results. • construct and interpret a variety of food chains, identifying producers, predators and prey 	<p>Pupils will have the opportunity to develop their knowledge about:</p> <p>Electricity</p> <ul style="list-style-type: none"> • classify and present data, identifying common appliances that run on electricity. • identify circuit components and build working circuits. • investigate whether circuits are complete or incomplete. • investigate which materials are electrical conductors or insulators • explain how a switch works in a circuit, build switches, and report my findings. • discuss and solve problems about electricity using reasoning skills. <p>Animals including humans</p> <ul style="list-style-type: none"> • identify and name parts of the human digestive system. • explain the functions of the digestive system • use scientific evidence to answer questions • identify the types and functions of teeth • identify similarities and differences related to scientific ideas. • ask scientific questions and choose a scientific enquiry to answer them • create an enquiry or test • make careful observations, appropriately record my results and use them to develop further investigations. • construct and interpret food chains

<p>SPRING TERM</p>	
<p>Working scientifically - Living things and their Habitat– pupils will have the opportunity to develop the following skills:</p> <ul style="list-style-type: none"> • sorting living things into a range of groups • using a range of methods to sort and group living things. • generating questions to sort vertebrates in a classification key. • identifying vertebrates by their similarities and differences. • using keys to identify invertebrates found in the local environment. • explaining how they have identified an invertebrate. • creating classification keys • creating tables and keys showing the characteristics of living things. • identifying changes and dangers in the local habitat. • recording observations on a map and in a table. • learning about environmental dangers and endangered species. • writing about and orally presenting findings from research. <p>Working scientifically - Sound – pupils will have the opportunity to develop the following skills</p> <ul style="list-style-type: none"> • identifying and explaining sound sources around school. • performing a dramatization of how sounds travel. • exploring how high and low sounds are created. • exploring and creating musical instruments, and explaining how they change pitch • exploring how sounds change over distance. • making string telephones. • investigating the best material for absorbing sound. 	<p>Living things and their Habitat - pupils will have the opportunity to develop their knowledge about:</p> <ul style="list-style-type: none"> • group living things in a range of ways • use a range of methods to sort living things. • generate questions to use in a classification key. • identify vertebrates by observing their similarities and differences • use a key to identify invertebrates • use evidence to identify an invertebrate • create a classification key • show the characteristics of living things in a table and a key. • recognise positive and negative changes to the local environment • record my observations in different ways • describe environmental dangers to endangered species • present my findings orally and in writing <p>Sound</p> <ul style="list-style-type: none"> • Explain how sound sources vibrate to make sounds. • Explain how vibrations change when the loudness of a sound changes. • Explain how sounds travel to reach our ears. • Describe the pitch of a sound. • Describe patterns between the pitch of a sound and the features of the object that made the sound. • Explain how sound travels through a string telephone. • Identify the best material for absorbing sound. • Create a musical instrument that can play high, low, loud and quiet sounds. • Make observations and conclusions. • Be able to answer questions based on their learning



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- making a musical instrument and explaining how it works.

SUMMER TERM

Working scientifically –States of matter- pupils will have the opportunity to develop the following skills:

Sort materials into solids, liquids and gases.

- Explain that heating causes melting, and cooling causes freezing.
- Identify the melting and freezing point of water.
- Describe evaporation and condensation using practical examples.
- Describe the effect of temperature on evaporation referring to their investigation.
- Identify the stages of the water cycle.
- Predict what will happen in an investigation.
- Make observations.

States of matter:

- sort and describe materials
- investigate gases and explain their properties
- investigate materials as they change state
- explore how water changes state
- investigate how water evaporates
- identify and describe the different stages of the water cycle.
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SCIENCE – YEAR 5 2022-23

AUTUMN TERM

Pupils will have the opportunity to develop the following skills;

Working scientifically:

- Plan enquiries, including recognising and controlling variables where necessary
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models
- Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations.

Pupils will have the opportunity to develop their knowledge about:

Earth and Space

- To describe the Sun, Earth and Moon as approximately spherical bodies
- To describe the movement of the Earth relative to the Sun in the solar system.
- To describe the movement of the Moon relative to the Sun.
- To use the idea of Earth's rotation to explain day and night.

Animals including humans

<ul style="list-style-type: none"> • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas • Identify scientific evidence that has been used to support or refute ideas or arguments. 	<ul style="list-style-type: none"> • To describe the changes as humans develop to old age. <p>NB – Send note to Parents before teaching puberty</p> <p>Living things and their habitats</p> <ul style="list-style-type: none"> • To describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
<p>SPRING TERM</p>	
<p>Working scientifically – pupils will have the opportunity to develop the following skills:</p> <ul style="list-style-type: none"> • Plan enquiries, including recognising and controlling variables where necessary • Take measurements, using a range of scientific equipment, with increasing accuracy and precision • Record data and results of increasing complexity using scientific diagrams and labels, tables, bar and line graphs, and models • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests • Use simple models to describe scientific ideas • Identify scientific evidence that has been used to support or refute ideas or arguments 	<p>Properties of Materials (and reversible changes) - pupils will have the opportunity to develop their knowledge about:</p> <ul style="list-style-type: none"> • Comparing and grouping together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • How some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • Solids, liquids and gases and decide how mixtures might be separated, including through filtering, sieving and evaporating • Comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • How dissolving, mixing and changes of state are reversible changes • Absorbency of materials <p>Living things and their habitats - pupils will have the opportunity to develop their knowledge about:</p> <ul style="list-style-type: none"> • Life processes and reproduction of plants: Germination, Growth, Fertilisation, Seed production, Seed dispersion
<p>SUMMER TERM</p>	
<p>Working scientifically – pupils will have the opportunity to develop the following skills:</p>	<p>Pupils will have the opportunity to develop their knowledge of:</p>

<ul style="list-style-type: none"> • Plan enquiries, including recognising and controlling variables where necessary • Take measurements, using a range of scientific equipment, with increasing accuracy and precision • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. • Present findings in written form, displays and other presentations. • Use test results to make predictions to set up further comparative and fair tests. • Use simple models to describe scientific ideas • Identify scientific evidence that has been used to support or refute ideas or arguments. 	<p>Forces</p> <ul style="list-style-type: none"> • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • Identify the effects of air resistance, water resistance and friction, that act between moving surfaces • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. • Working scientifically project on the weight of school bags or friction of shoes on different surfaces. <p>Properties of Materials (and irreversible changes)</p> <ul style="list-style-type: none"> • Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.
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SCIENCE – YEAR 6 2022-23	
AUTUMN TERM	
<p>Pupils will have the opportunity to develop the following skills; Continue building on the Year 5 Working Scientifically skills and include:</p> <ul style="list-style-type: none"> • Ask questions and develop lines of enquiry based on observations. • Make predictions using scientific knowledge and understanding. • Plan and design investigations and experiments to make observations and test predictions. • Identify independent, dependent and control variables and other factors to be taken into account when collecting evidence and data. 	<p>Pupils will have the opportunity to develop their knowledge about:</p> <p>Living things and their habitats (Classification)</p> <ul style="list-style-type: none"> • Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals • Give reasons for classifying plants and animals based on specific characteristics.

- Select appropriate techniques, apparatus, and materials during fieldwork and laboratory work, working safely.
- Make and record observations and measurements using a range of methods for different investigations.
- Evaluate the reliability of methods and suggest possible improvements.
- Present observations and data using appropriate methods, including tables and graphs.

Animals including Humans (Organ Systems)

- Describe the ways in which nutrients and water are transported within animals, including humans.
- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- Working scientifically project on effect of exercise on pulse/ breathing rate.

SPRING TERM- Year 6

Pupils will have the opportunity to develop the following skills;
Continue building on the Year 5 Working Scientifically skills for KS2 and include:

- Ask questions and develop lines of enquiry based on observations.
- Make predictions using scientific knowledge and understanding.
- Plan and design investigations and experiments to make observations and test predictions.
- Identify independent, dependent and control variables and other factors to be taken into account when collecting evidence and data.
- Use classification keys.
- Select appropriate techniques, apparatus, and materials during fieldwork and laboratory work, working safely.

Pupils will have the opportunity to develop their knowledge about:

Light

- Recognise that light appears to travel in straight lines
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Electricity

- Make and record observations and measurements using a range of methods for different investigations.
- Evaluate the reliability of methods and suggest possible improvements.
- Present observations and data using appropriate methods, including tables and graphs.

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches (only for series circuits)
- Use recognised symbols when representing a simple circuit in a diagram.

SUMMER TERM – Year 6

Working scientifically – pupils will have the opportunity to develop the following skills:
Continue building on the Year 5 Working Scientifically skills and include:

- Ask questions and develop lines of enquiry based on observations.
- Make predictions using scientific knowledge and understanding.
- Plan and design investigations and experiments to make observations and test predictions.
- Identify independent, dependent and control variables and other factors to be taken into account when collecting evidence and data.
- Select appropriate techniques, apparatus, and materials during fieldwork and laboratory work, working safely.

Pupils will have the opportunity to develop their knowledge of:

Evolution and Inheritance (Fossil Record)

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

Evolution and Inheritance (Adaptation and Evolution)

- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents



- Make and record observations and measurements using a range of methods for different investigations.
- Evaluate the reliability of methods and suggest possible improvements.
- Present observations and data using appropriate methods, including tables and graphs.
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- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

KS3 Chemistry

Undertake an investigation on chemistry in preparation for KS3 e.g., candles, beakers and burn time.