



## **Science Rationale**

### Introduction

This comprehensive and bespoke curriculum has been designed with the needs and experiences of our children in mind and ensures that all children are given the best possible chance to succeed and develop the skills and knowledge they will need to enjoy and achieve at the end of Key Stage 1 and beyond. It draws on local inspiration and the children's own experiences and is unique to our school.

This Rationale accompanies the school science policy and explains in more detail the activities undertaken during each year group and the reasons for doing them, and where necessary relates this to the National Curriculum.

The document is designed to be read to gain an insight into what children will do on a weekly basis and how our science program will grow their scientific knowledge and vocabulary.

## Intent

At Cheadle Catholic Infant School our vision is to give the children a Science curriculum which enables them to explore and discover the world around them, confidently, so that they have a deeper understanding of the world we live in.

To achieve this it involves exciting, practical hands on experiences that encourage curiosity and questioning.

We will inspire our children by giving them the opportunities to pursue their natural curiosity; promoting the experience of exploring and investigating scientific phenomena, in a range of contexts, to ensure a continually evolving knowledge and understanding of the world around them.

Our children will be encouraged to ask questions, take risks, experiment, reflect and learn from mistakes, in a safe environment; whereby they acquire and apply core skills which equip them for an ever-changing world.

### **What our pupils will learn in Early Years Foundation Stage (EYFS):**

The EYFS Curriculum for Understanding the World is taught in a variety of ways through adult-led and adult-supported tasks and child-initiated learning. in well-resourced provision areas, both indoors and outdoors. The themes are linked to the Scheme of Work for Key Stage 1 to ensure progression as pupils move from EYFS to Key Stage 1.

### **What our pupils will learn in Key Stage 1:**

We use a bespoke Scheme of Work to deliver the National Curriculum for Science throughout Key Stage 1 and 2. The scheme of work is well-sequenced, practical, creative and engaging. It incorporates planned opportunities to carry out different types of scientific investigation.

In Key Stage 1, the Scheme of Work provides planning for additional Science topics beyond the requirement of the National Curriculum. We have chosen to teach the additional topics to provide a foundation for the work which will take place in Key Stage 2.

## Implementation

How the Science Curriculum will be taught to our pupils (implementation):

Throughout EYFS, Key Stage 1 and Key Stage 2 science lessons take place weekly. We ensure that throughout these years clear progression is planned and mapped out with a scheme of work so that each objective of the national curriculum is covered within a creative, bespoke framework.

In addition to the scheme of work, we use knowledge organisers for each topic that lists expected prior learning from the previous year and learning that will take place in the following year.

Each lesson is planned so that it will have an activity that will improve scientific enquiry skills and introduce relevant scientific vocabulary from the knowledge organisers.

## Progress and Assessment

### **EYFS:**

In Nursery regular observations and assessments are recorded using the online journal Tapestry. In Nursery and Reception learning is recorded on floor books. This contributes towards a summative assessment at the end of EYFS using the Early Years Outcomes for Understanding the World.

### **Key Stage 1:**

Frequent, ongoing observational assessments are made throughout the half-terms learning. Ongoing memory box questioning helps teachers to assess the learning that is 'sticking' in the children's memory. Discussions are regular between the co-ordinator and staff. Evidence of learning is recorded in science books with learning objectives set as targets and used for formative assessment. End of topic assessments are completed by the children. These inform summative assessment at the end of each year including the key skills and knowledge.

## Science Applied to Each Year Group

## Early Years – Nursery and Reception

The most relevant outcomes for science are taken from the 'Understanding of the world' area of learning in the Early Years statutory framework. This involves guiding children to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment. Science makes a significant contribution to the objectives within the ELG's of developing a child's knowledge and understanding of the world.

When children in Nursery and Reception use a range of 'Characteristics of Effective Learning' (Development Matters) in their independent learning, these can be seen as complementing 'Working Scientifically'. Such activities are-

- Playing and exploring – engagement; finding out and exploring; playing with what they know; being willing to 'have a go',
- Active learning – motivation; being involved and concentrating; persevering; enjoying achieving what they set out to do,
- Creating and thinking critically – thinking; having their own ideas; making links; choosing ways to do things.

## Nursery

In Nursery, the scientific journey begins as we focus on understanding the world. It is introduced through activities that encourage children to explore, problem solve, observe, predict, think, make decisions and talk about the world around them.

### *Knowing Our Similarities and Differences*

We explore creatures, people, plants and objects in their natural environments. We grow plants and vegetables, exploring what they need to grow. We discuss what we need to stay healthy and safe, through our daily routines such as hand washing and eating our healthy snacks. During our weekly P.E lessons, we notice changes that happen in the body.

Opportunities are planned to make observations of animals and plants, explain why some things occur and talk about changes. We look at the differences between some animals and us. We explore life cycles by observing butterfly houses and watching chicks or ducklings hatch. In the spring term we also organise a trip to the farm to explore animals at close quarters.

We look at pictures of themselves as babies and talk about how their needs have changed.

The children observe and manipulate objects and materials to identify differences and similarities. For example, through play opportunities in our mud kitchen they have access to a range of natural and manmade resources and get to explore their different functions.

They also learn to use their senses; feeling dough or listening to sounds in the environment, such as sirens or farm animals.

The children are encouraged to ask questions about why things happen and how things work. Through play in our construction area activities such as increasing the incline of a slope to observe how fast a vehicle travels or opening a mechanical toy to see how it works are undertaken.

Through questioning and observation during continuous provision in areas like the sand or water tray, children are asked questions about what they think will happen when they use a certain jug or container to help them communicate, plan, and investigate through play.

We also have a visit from a dentist.

### *Looking at Changes Over Time*

In the second term we take the children on a winter walk in Bruntwood Park.

Children observe and manipulate objects and materials to identify differences and similarities. There are play opportunities in our mud kitchen – with access to a range of natural and manmade resources

We elicit questions about why things happen and how things work.

We use Incy-Wincy spider to open-up conversations about rain and different geographical water features.

Children play in our construction area: with activities such as increasing the incline of a slope to observing how fast a vehicle travels or opening a mechanical toy to see how it works. Questioning and observations take place during continuous provision in areas

like the sand or water tray.

Spring walk in Bruntwood Park happens towards the end of this term.

### *Growing – Looking After Plants and Animals*

In the final term we use living eggs- children watching chicks develop and learn about the life cycle of a chick.

Through observations of animals and plants, we explain why some things occur and talk about changes. This might include a trip to the farm to explore animals at close quarters.

We grow plants and vegetables, exploring what they need to grow, taking photos of seeds that they grow and leave them available for the children to order and revisit independently. Children also look at the life cycle of a plant.

Children look for bugs over the course of a week. We look at life cycle of a butterfly and use words to describe the stages eg first it was an egg, then it was a Caterpillar, now it is a butterfly. We also look at the habitat of minibeasts, how they are different for animals and how our behaviour can change the environment and undertake a mini-beast hunt.

We also include a summer walk into Bruntwood Park during this term.

## Reception

In Reception we continue to understand the world by exploring the following themes:

- All about me
- Seasons and celebrations
- Superheroes
- Space
- Growing plants and mini beasts
- India

## Autumn

In early autumn we ask children how they are the same as others, and what makes them different to friends and family. We look at how their journey of life has progressed since birth, using baby photos.

The children explore the world around them using appropriate senses to make observations. They consider where they live and how they get to school. It teaches them to notice change and to use appropriate senses from the five senses to make observations. They do a scent sense investigation.

We have an introductory discussion of plants, animals and natural objects with the children and the natural world – children begin to explore the world around them, making observation and drawing pictures of plants and animals. Children also discuss with us how we care for the environment.

In this term children observe the effects of exercise on their bodies, learn about healthy diets and what constitute healthy foods and not healthy foods. We talk about some of the things which they have observed.

In this term we also have a visit from a dental nurse.

In late autumn we then look at seasons and celebrations using Diwali and Bonfire Night, to include awareness of different cultures. Including a visit from a parent to speak about Diwali.

We make lamps and use different materials. We also introduce technological devices such as i-pads and memory boxes that we shall use throughout the year.  
Seasons and seasonal change

In this term we undertake an autumn walk to Bruntwood Park

## Spring

As the seasons turn to winter we look farther afield into superheroes and space.

We talk about why things happen and how things work: We investigate magnets and pulling and pushing forces and explore technology.

In this term we cover materials for the first time. We undertake a float/sink test, and consider which materials are best for making a boat.

In this term we investigate the changes and processes in the natural world. To further understand the world in which we live, we consider the earth, sun and moon. We discuss the earth: our planet! What is it like and how can we care for it. But what about the sun? What does that give us and even though it is so far away, are there any dangers from it? How would the children describe the moon and could we live there?

Then we discover planets to engage with the concept of space. Can we travel into space? In previous years we visited Jodrell Bank which is a great hook for children. This local resource was fantastic for experiencing what is in space and seeing the huge telescope was jaw dropping for the children. However, this year we booked "The Wonder Dome" to come to school, a big inflatable dome which the children go into to see the planets and stars.

Children use technology such as Bee-bot toys to gain information and make space rockets.

## Summer

In the summer term, our attention is turned to growing and mini beasts! We first research mini-beasts and then it's off to Bruntwood Park we go on a minibeast hunt! We compare different minibeasts and habitats and ask questions like "What creature is this?" "How many legs has it got?" and "Where does it live?" in order to classify them into groups. We also discuss the lifecycle of a butterfly and make our own lifecycle of a butterfly. We also look at the lifecycle of a frog.

So we can look at the lifecycle of chicks, we observe 'living eggs' which we set out in an area of the school for all the early years to watch and understand.

In order to learn how things grow we plant our own broad bean seeds. We look at what a plant needs to grow and record this. We observe over time, learning the names of the basic parts of the plant, as they grow. We label the basic parts of a plant.

At the start of the second half term, Early Years and Year 1 begin to grow butterflies from tiny caterpillars. The butterfly cycle is observed between three to five weeks. The children raise and feed their own butterflies before releasing them into the wild.

And then, to complete science in reception the second half of the summer term is all about India.

Children learn about the natural world and investigate similarities and differences in



contrasting environments, asking questions about aspects of the world in which we live.

Children discuss what life is like in this country and what life is like in other countries.

We do tests to see if objects float or sink and we consider which materials are best for building a boat. We make observations of sea animals, showing concern for living things and the environment and asking questions of the natural world.

We learn about exercise, eating, sleeping, good hygiene and good health and safety when tackling new challenges and managing risks.

The year ends with a Summer walk in Bruntwood Park looking at the natural world we live in and the season of summer.

## Year 1

In year one we learn about:

- My body and its senses
- Materials
- Polar places
- Plants and terrific trees where we live
- Animals
- Seaside and summer holidays

In Year 1 our approach matches that of the National Curriculum and in each term we look scientifically at the relevant season.

**'Seasonal Change'** is covered every term and **'Working Scientifically'** is covered throughout each topic.

### Autumn

The first half of autumn involves looking at the features of autumn and comparing it to the summer just passed.

In the autumn term the children ask themselves: “Who am I?” with a focus on “**My body and its senses**”.

We look at our bodies and the children draw, label, and classify our simple body parts. Children become more aware of their senses and which parts of body are associated with each sense. To illustrate this, we walk around school, observing the many ways we use our senses in the world around us. Children then apply these observations to answer other questions about how our senses are used in other ways, for example using sight for finding their friends in the playground and hearing for the sound of music.

The children then conduct a senses experiment on taste with food tasting. Children use their senses such as smell, touch and sight so say how they think the food will taste, for example, sweet, bitter or sour. We compare and record findings using data.

We continue in the second half of this half-term with a new topic “**Terrific Trees**” and Autumn continues our look at the seasons with a walk to Bruntwood Park. We use our senses to observe, and we also learn about tree classification (deciduous and evergreen) and look at what is happening to the leaves. The children learn to name trees by their leaves and label its parts.

The next half-term topic is “**Materials**” and we roll up our sleeves for lots of practical activities exploring what materials are, their names, their properties and importantly how we classify them. Working scientifically, they sort and group materials and investigate how they are used and learn about ‘properties’, expanding their vocabulary with words like translucent, transparent or opaque, hard, soft, waterproof or absorbent etc.

Children discuss what materials are best used for a pet bed. They test materials and write up their findings, investigating the best materials to use and explain why by identifying properties.

## Spring

As winter arrives we compare things to autumn and record the differences. How has the weather changed? What effect has it had on the world around us such as the amount of clothing we would wear in winter compared to autumn? What light sources do we have in the darkness of winter? When briefly looking at light sources we work scientifically, for example, observing how the length of daylight in a day change throughout the year?

As January is cold it is the perfect time to discover “**Polar places**”! This topic extends their learning of materials and begins their school taught scientific knowledge of Arctic/Antarctic animals. Our children become ‘Polar explorers’.

As a primary source of information, an Arctic explorer visits the school and explains what an explorer needs for an expedition. Children then report their choices using secondary sources of information such as books and the Internet to further scientifically research what a polar explorer needs.

Children choose gloves for their expedition and test gloves that are provided to see if they are warm and waterproof. We consider which materials would make the best snow gloves and examine the differences between waterproof and non-waterproof materials. The children hold ice to experiment and investigate.

In order to expand our knowledge of animals we look at polar animals – and categorise which are herbivore, carnivore or omnivore. For example, they learn how polar bears eat seals, and seals eat fish.

Using the ability to categorise we look at a variety of common animals to identify and classify into herbivore, carnivore and omnivore. We learn what camouflage means and how animals camouflaging helps survival.

In the latter part of spring term what could be more fun and educational than going “**On safari?**”

As scientific learning often involves connections to other types of lifeforms, we learn more about birds that inhabit trees and when out in the school grounds and park children learn the names of common birds we might see there. We conduct a bird watch, compiling a tally chart.

Children discover how birds are different from us as they lay eggs, have beaks, wings and feathers. What do birds eat? We discuss where best to put bird feeders.

We encourage children to keep learning the names of birds they might see in their garden, in the park or at school.

Children go on an insect hunt. Before we go on the insect hunt, we discuss by asking the children to think where they might find different insects. They compare insects: how many legs does this creature have? How many body parts? Children think of a set of questions about insects and ask each other.

In order to better understand what an invertebrate is, we learn about the structure of insects and their features, hoping children can identify they have antennae, and they have 6 legs so more than we do. This then starts to demonstrate the ways invertebrates differ to humans.

A reptile road show is created, and children learn the names of different reptiles, such as snake, turtle, lizard etc. We learn by labelling their structure that all reptiles are vertebrates.

Children also learn about amphibians such as frogs, toads and newts. These are cold blooded vertebrates that can live in water and then on land. We draw and label their structure.

Sorting animals into which group they belong is extensively covered in this topic, including comparisons to humans and other mammals.

Categorising animals into vertebrates and invertebrates will reinforce scientific classification of things that will be a theme of this term. Comparing different types of animals to humans is a recurring theme.

## Summer

As it's getting a little warmer now, we turn our attention to "**plants where we live**". As all plants have a starting point, we plant and grow sunflowers from seeds, recording the method we use and remembering what it needs to grow. Working scientifically we observe over time.

The children look at the basic structure of flowering plants, labelling the parts. They learn the names of common garden flowers, before widening their scope of knowledge onto common wildflowers.

The spring walk we do to Bruntwood Park enables children to extend their learning from flowers to a recap on evergreen and deciduous trees, noting their differences in this season and revisiting the basic structure of trees. Can the children still identify trees by their leaves?

In school, children get to see the lifecycle of a butterfly unfold in front of their eyes. Butterflies arrive as caterpillars and children observe them grow. Can children also

spot butterflies when outside and name them?

In the second half of the term we look at the “**seaside and summer holidays**”. Children become ‘marine biologists.

Children learn about the structure of fish exploring their body parts e.g. scales, fins and gills.

Questions are asked about what animals would be found in a rock-pool: children learn what seashells are and how they would have once belonged to a creature. Working scientifically is achieved by research of secondary sources of information, using computers and books.

We then identify and classify other seashore animals such as crabs and seagulls. In addition to grouping into fish, mammals or birds, we also revisit what carnivore, herbivore and omnivore mean.

Children are reminded of the terms reduce, re-use, recycle in science and we discuss how we can do this to help look after our seas and our planet.

Finally, we revisit the changing seasons with an exploration of summer. Children are asked what they would pack for a summer holiday. Everyone then compares this to what would have been packed if visiting the Polar regions in winter. We remember what was taught about materials. Will summer clothing be different? We also discuss how to keep sun safe, e.g. finding shade when we go on a Summer time walk.

To end year one we do the Skittles experiment as a celebration of science and all things of wonder. We finish working scientifically for year one by adding water to the different coloured Skittles and observe the colours mixing over time. The children predict, discuss what happened and write up why they think this happened- just as a scientist would.

## Year 2

In year two we learn about:

- Plants
- Health/exercise/hygiene and the features of living things
- Survival Adventure

- Uses of Materials
- Happy Habitats
- Food Chains

Throughout the year we expand children's vocabulary in these different areas, using hooks that the class enjoy such as growing plants, designing a tent from different materials and so on.

### Autumn

In the autumn our class become "**young gardeners**"! We go into the school grounds to explore with identification sheets what is growing. Children record what they see and learn. As well as growing plants from seeds and bulbs – which the children choose themselves with a germination race in the classroom - we learn about different types of plants and where they grow as well as the different parts of a plant and what they need for germination and to survive.

We measure seedlings as they grow, placing seeds in various places and experimenting along the way. We do plenty of observations and naming of plants in the school grounds. Lifecycles are also looked at in this topic. The lifecycle of a seed is recorded and this learning reinforced with a recording of the lifecycle of a dandelion.

Later in the autumn term it's "**healthy me**" time. The children learn the different things needed to stay healthy. A fitness lesson teaches them about exercise and how different exercises keep different parts of the body healthy, as well as aiding mental health and well-being.

We learn about food and identify different types of food. We look at snacking – healthy and processed foods are investigated looking at each food category. We complete a pictogram about favourite snacks.

We then investigate "how clean are your hands"? Bread is used to conduct a clean versus dirty hands experiment to learn about germs.

Further investigation, in groups we conduct a 'sugary drink and egg experiment' to find out what happens when sugar is mixed with eggs, working scientifically again.

Finally we celebrate being healthy by planning and eating healthy snack bowls.

## Spring

The focus in the spring term is animals in the first half term, followed by the use of materials in the second.

The title of the topic in the first term is “**survival adventure**”. We first think about what makes something alive and not alive. We explore and compare the differences between things that are living, dead, and things that have never been alive.

Pupils will notice that animals, including humans, have offspring which grow into adults. We discuss lifecycles.

Children find out about and describe the basic needs of animals, including humans, for survival (water, food and air)

In the second half term the focus is on the “**uses of materials**”; collecting, classifying and learning about the properties and changing states of materials. This fun topic enables children to learn about the properties of materials – bending, squashing, twisting, stretching - and why different materials might be used to make different things such as pots and fencing. Children sort materials, linking then to recycling.

We carry out a silly materials experiment describing what we might use the silly material to make- comparing suitability.

The children design a state-of-the-art tent and consider which materials are best for waterproofing and which are strongest.

## Summer

Science in the summer term continues with “**Happy Habitats**” and “**Food Chains**”.

We undertake another venture to look for living things and gain a better understanding of animals and their habitats and learn about the different habitats in the UK.

We discover what all living things do, what a habitat is and how different animals are suited to different habitats. The children learn the names of habitats such as pond, woodland etc and the types of micro-habitats (such as under logs and in bushes).

We also compare local habitats with those in more extreme climates and habitats underwater. The children make habitat posters.

Children sort and classify animals by the type of habitat that they live in. They create a habitat and conduct a woodlouse live investigation.

For food chains, we discuss how animals, including humans, get their food and what is a food chain?

We encourage children to have a go at making a few food chains themselves using a selection of animals. They create their own food chain paper chains. Label the producer and the consumers. They are able to explain what happens at each stage.

We encourage discussion about types of animals and what type of food they eat.

Children will identify different types of animal depending on their diet, and we conduct a “whose poo?” Investigation.

In the Summer term we also celebrate our school cultural capital and hold a whole school science week where we learn about scientists and the different types of scientists, ensuring cultural capital is embedded in the children’s thoughts of being a scientist themselves.

## Impact

At Cheadle Catholic Infant School, we recognise the importance of science in every aspect of daily life. As one of the core subjects taught in primary schools, we give the teaching and learning of science the prominence it requires.

The scientific area of learning is concerned with increasing pupils’ knowledge and understanding of our world, and with developing skills associated with science as a process of enquiry. It will develop the natural curiosity of the child, encourage respect for all living things, their habitats and the physical environment providing opportunities for critical evaluation of evidence.

Our bespoke science curriculum enables children to explore and discover the world around them, confidently, so that they have a deeper understanding of the world we live in.

The science curriculum we provide will give children the confidence and motivation to



continue to further develop their skills into the next stage of their education and life experiences. We consider and will make use of 'Science Capital' as a conceptual tool to help develop our pupils' aspirations and involvement in science. Moreover, we aim to prepare our pupils for life in an increasingly scientific and technological world.

Through the exciting, practical hands-on experiences that encourage curiosity and questioning, we will inspire our children by giving them the opportunities to pursue their natural curiosity and promoting the experience of exploring and investigating scientific facts in a range of contexts. This will ensure a continually evolving knowledge and understanding of the world around them.

Signed: Belinda Brennan-Sweeney

Date: September 2023