St Benedict's Science Policy

St. Benedict's Primary School is a Rights Respecting School and the United Nations Convention on the Rights of the Child is at the heart of everything we do.

"Enjoying our rights and fulfilling our dreams"

We believe that by understanding their own rights, children learn to respect and value the rights of others.

We aim for our children to be:

- Ambitious-To have a strong desire to achieve
- Resilient- To have the ability to withstand and bounce back from difficult life events
- Respectful- To behave in a way that shows you care about your own rights and the rights of others, the local and global community and environment.

The following articles underline our Aims;

Article 3

"The best interests of the child must be a top priority in all our actions."

Article 29

"Education must develop every child's personality, talents and abilities to the full. It must encourage the child's respect for human rights, as well as respect for their parents, their own and other cultures and the environment."

Part 1: Intent

What is our vision for Science?

The starting point for our curriculum at St. Benedict's Primary School is our children. Language and literacy are at the heart of our curriculum and is the basis from which all other subjects evolve. We therefore aim to develop the children's scientific skills and knowledge through a connected and language-rich curriculum.

Our vision is for all pupils to be confident and competent Scientists. Our Scientists have an age-appropriate and growing understanding of scientific concepts; they have the knowledge, understanding, skills and reasoning to investigate and explore phenomena; they can think logically and organise and explain their ideas.

We aim for our children to be; successful learners, responsible and rights respecting citizens and confident individuals.

The overarching aims for Science in the national curriculum are:

- To ensure that all pupils develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- To develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- To ensure that pupils are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Part 2 Implementation

How do we organise and deliver our Science Curriculum?

Our Science Curriculum is organised across the year as follows:

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
1	Everyday Materials	Human Senses	Seasonal Change		Plant Parts	Animal Parts
2	Human Survival	Habitats	Use of Materials	Plant Survival	Animal Survival	
3	Animal Nutrition and Skeletal systems		Forces and Magnets		Plant Nutrition and Reproduction	Light and Shadows
4	Food and the Digestive System	Sound	States of Matter	Grouping and Classifying	Electrical Circuits and Conductors	
5	Forces and Mechanisms	Earth and Space	Human Reproduction and Ageing		Properties and changes of materials	
6	Circulatory System		Electrical Circuits and Components		Light Theory	Evolution and Inheritance

Why do we teach it in this order?

Our science projects are sequenced to develop both children's substantive and declarative knowledge, and make meaningful links to other subject areas, such as Geography, Design Technology or Art and Design.

For example, in Year 3, the projects *Plant Nutrition and Reproduction* and *Light and Shadows* are taught alongside the design and technology project *Greenhouse* and the art and design project *Beautiful Botanicals*. These links allow for children to embed their substantive knowledge in new and often real-life contexts.

The sequencing of projects ensures that children have the substantive knowledge and vocabulary to comprehend subsequent projects fully. Each project's place in the year has also been carefully considered. For example, projects that involve growing plants or observing animals are positioned at a suitable time of year to give children the best possible opportunity to make first-hand observations. Within all the science projects, disciplinary knowledge is embedded within substantive content.

Year 1

In Year 1, children start the autumn term with *Everyday Materials*, linking this learning to the design and technology project *Shade and Shelter*. In the *Human Senses* project, they learn

about parts of the human body and those associated with the senses. In the spring project *Seasonal Changes*, they learn broadly about seasonal changes linked to weather, living things and day length. They revisit some of this learning in the following summer term project *Plant Parts*. They finish with the project *Animal Parts*, linking back to their knowledge about body parts and senses and identifying commonalities.

Year 2

In Year 2, children begin the autumn term with the project *Human Survival*, learning about the survival needs of humans, before expanding to study animals within their habitats in the project *Habitats.* Building on learning from Year 1, children learn about the uses of materials in the spring project *Uses of Materials* and begin to understand changes of materials through simple physical manipulation, such as bending and twisting. The spring *Plant Survival* project also explores survival, with children observing what plants need to grow and stay healthy. Finally, in the project *Animal Survival,* children bring together learning from the autumn term, thinking about what animals need to survive.

Year 3

Having learned about human body parts, the senses and survival in Key Stage 1, children now focus on specific body systems and nutrition in Key Stage 2. In the autumn term of Year 3, they learn about the skeletal and muscular system in the project *Skeletal and Muscular Systems*. This learning again links to other animals, with children identifying similarities and differences. Children also learn about healthy diets alongside the autumn term design and technology project *Cook Well, Eatwell*. In the spring term, properties of materials are revisited in the project *Forces and Magnets*, with children identifying magnetic materials and learning about the non-contact force of magnetism. They also begin to learn about contact forces, investigating how things move over surfaces. Science learning about rocks and soils is delivered through the geography project *Rocks, Relics and Rumbles*. Children begin to link structure to function in the summer *Plant Nutrition and Reproduction* project, identifying the plant parts associated with reproduction and water transport. Children finish the year with the project *Light and Shadows*, where they are explicitly introduced to the subject of light, with children learning about shadows and reflections, revisiting language from Key Stage 1, including opaque and transparent.

Year 4

In the autumn term of Year 4, children learn about the digestive system, again making comparisons to other animals, in the project *Digestive System*. The second autumn term project *Sound* introduces the concept of sound, with children identifying how sounds are made and travel. They learn and use new vocabulary, such as pitch and volume, and identify properties of materials associated with these concepts. In the spring term project *States of Matter*, children learn about solids, liquids and gases and their characteristics. They understand how temperature drives change of state and link this learning to the project *Misty Mountain, Winding River*, in which children learn about the water cycle. Up to this point, children have had many opportunities for grouping and sorting living things. In the spring project *Grouping and Classifying,* children recognise this as 'classification' and explore classification keys. Finally, in the summer term, children study electricity by creating and recording simple circuits in the project *Electrical Circuits and Conductors*. They also build on their knowledge of the properties of materials, identifying electrical conductors and insulators.

Year 5

In the autumn term of Year 5, children broaden their knowledge of forces, including gravity and air and water resistance, in the project *Forces and Mechanisms*. They revisit learning from design and technology projects, including *Making It Move* and *Moving Mechanisms*, to explore various mechanisms and their uses. Their knowledge of gravity supports the autumn term project *Earth and Space*, so they can understand the forces that shape planets and our solar

system. They also develop their understanding of day and night, first explored in the Year 1 project *Seasonal Changes*. Having learned that animals and plants produce offspring in earlier projects and studied plant and animal life cycles in *Sow, Grow and Farm*, children now focus on the human life cycle and sexual reproduction in the spring term project *Human Reproduction and Ageing*. In the summer term project *Properties and Changes of Materials*, children revisit much of their prior learning about materials' properties and learn new properties, including thermal conductivity and solubility. To this point, children have learned much about reversible changes, such as melting and freezing, but now extend their learning to irreversible changes, including chemical changes.

Year 6

In Year 6, the final body system children learn about is the circulatory system and its roles in transporting water, nutrients and gases in the autumn term project *Circulatory System*. Science learning about classification is delivered through the spring term geography project *Frozen Kingdoms*. In the spring term, children also build on their knowledge about electrical circuits from Year 4, now learning and recording standard symbols for circuit components and investigating the function of components and the effects of voltage on a circuit in the project *Electrical Circuits and Components.* In the summer project *Light Theory,* children recognise that light travels in straight lines from a source or reflector to the eye and explain the shape of shadows. Finally, in the project *Evolution and Inheritance*, children learn about inheritance and understand why offspring are not identical to their parents. They also learn about natural selection and how this can lead to the evolution of a species.

Throughout the science scheme, there is complete coverage of all national curriculum programmes of study.

Celebrating Scientists

Each half term, all classes focus on a key scientist. These are directed by the Science Leader. The Scientist will be introduced early on in the half term, with key facts about their life and achievement explained. Pupils will then revisit this information through Retrieval Practice on a regular basis. The aim is to develop a growing knowledge of a diverse range of scientists.

Planning and Preparation

Medium-Term Planning is based on the Cornerstones Maestro. Each unit of work is structured around the 'Four Cornerstones'

Engage

- 'Hooks' learners in with a memorable experience.
- Sets the scene and provide the context for learning.
- Asks questions to find out children's interests.

Develop

- Teaching facts and information for deeper understanding and knowledge.
- Demonstrate new skills and allow time for consolidation.
- Provide creative opportunities for making and doing.

Innovate

- Imaginative scenarios that encourage creative thinking.
- Enables children to apply previously learned skills.
- Encourages enterprise and independent thinking.

Express

- The environment for reflective talk.
- Creates opportunities for shared evaluation.
- Celebrates and share children's success.
- Identifies next steps for learning.

Year groups plan collaboratively and in advance so that resources are shared and time is well-managed.

By being well-prepared for lessons (secure subject specific knowledge and planning the means of delivery and participation) teachers are able to free up Working Memory and focus more ***perceptively*** and ***attentively*** on pupils.
Teacher preparation should focus on:

- **Exemplar answers**

What will the answers be to the questions? What will an exemplary answer look like? Debating this prior to lessons is excellent professional development and frees up space in the working memory during lessons.

- **Misconceptions**

What errors are pupils most likely to make? How can these be overcome?

- **Means of Participation**

How will pupils be engaged?
How long will be spent on each segment?
How will pupils understand the links between each section of the lesson? (Segues)

- **Sharing or Co-constructing Learning Objectives and Success Criteria**

A skill or knowledge-based objective needs to be clear and built into the plan.
This should be a generic objective, rather than just specific to the lesson so that the knowledge and skills are transferable. Co-constructing the Success Criteria with pupils gives them ownership of their learning. The Learning Objective and Success criteria should provide the basis of feedback given.

Lesson Structure and Pace

Our curriculum aims for a mastery of ***deep knowledge***. New or abstract concepts will need to be explicitly taught through concrete examples and representations. Pupils then need time to practise this and apply it to other examples so the knowledge is transferred.

Lesson structures will vary depending on the subject knowledge and skills being taught.
Typically, Science lessons will include the following elements:

Practical exploration, observation and investigation
Pupils use practical resources to observe or explore a concept or phenomena.
Appropriate to their age, they are taught key skills in order to observe, predict, record, investigate, evaluate and draw conclusions.

Instructional teaching:

- I do - teachers explicitly teach and model or represent a new concept. Pupils will observe or may be asked to take notes. Pupils are not asked questions at this point in the lesson.
- We do - teachers engage pupils in reviewing knowledge together. Teachers may demonstrate tackling a new problem and draw on pupils to identify similarities in methods or concepts.
- You do - pupils are asked to independently tackle problems or tasks and then they are reviewed. 'Show me' is used frequently here. This point of a lesson is crucial for

assessing pupils' initial understanding and determining what level of support or challenge is required.

Teachers ensure quality time is spent on clear instructional teaching, especially when introducing new or complex concepts.

Independent Learning

All pupils must have work that they can independently access. Pupils with SEND or EAL are provided relevant resources to support them and may require some additional support. However, it is essential that this support does not prevent them from working independently.

Teachers will spend this time, either with a small group, that they have planned to work with, or circulating the room. This allows teachers to gauge misconceptions that will either be addressed with individuals, groups or the class, within the same lesson, or the next lesson.

Retrieval Practice

Prior learning is frequently revisited in subsequent lessons. Pupils will revisit learning from either the week or unit before, or more complex questions asking pupils to apply prior learning. The format of these will vary, depending on the content of lessons.

Knowledge Organisers are shared with pupils and parents and are used to help pupils remember key information.

At the end of each unit, pupils complete a short quiz, which provides the opportunity for pupils to remember information and for teachers to assess what pupils have learnt.

The Learning Environment

The Science Working wall must be in line with standards set out in the Teaching, Learning and Assessment Policy.

It must be accessible and purposeful and contains:

- What are we currently learning?
- Relevant information to support pupils learning
- Steps to Success and modelled examples
- Examples of good practice taken from children's books
- Information about the focus Scientist

Presentation of Learning

Pupils record learning in their Science books and continue working in the same Science book until it is completed. The expectations for these should be in line with the Teaching, Learning and Assessment Policy.

The short date and a short title are used at the start of each piece of work. The title should reflect the learning objective for the lesson.

Any drawings or graphs should be done on plain or squared paper, which is stuck in flat into the book. Any scaffolds or support sheets should be stuck flat and neatly into books.

Roles and responsibilities

Science Leaders are responsible for ensuring day to day high standards and consistency within Science and providing support and development opportunities where required.

Class teachers are responsible for implementing the Science Policy within their own classrooms, engaging in CPD offered and identifying and developing areas of their own

practice to ensure consistently high standards. Wilmington suggests that 'Teaching, like any complex cognitive skill, must be practised to be improved.'

Part 3: Impact

How do we know that our Science Curriculum is successful?

Our Progression Map details the end points for pupils knowledge and skills and the steps we expect pupils to take to reach them. It is split into separate aspects of Science e.g. Gathering and Recording Data.

Formative Assessment (for Learning)

Teachers deploy a range of strategies to assess learning and to provide feedback during lessons in line with our Teaching, Learning and Assessment Policy. These include listening to, and observing Talk Partners, Show Me, Cold Call and Show Call.
It is essential to give pupils time to explore practically and to carefully craft discussions in order to identify misconceptions.
Pupils are given time to self and peer assess and are given either individual, group or whole class feedback. Pupils are given time to respond to feedback with green pens.

Summative Assessment (of Learning)

Summative assessments are made in 2 main ways:

- **Test-based assessments**: each unit of work has matching quizzes which pupils complete. Teachers can use these as both retrieval practice and to inform their teacher assessment.
- **Descriptor-based assessments**: work is measured against descriptive statements of progress and recorded on FROG.
  This is completed at the end of each unit of work.

Monitoring and Evaluation

Monitoring activities include:

- Pupil voice
- Staff voice
- Book Looks
- Learning walks

Assessment data, alongside feedback from monitoring activities, is evaluated to ensure this policy is implemented consistently and effectively. Outcomes of this are shared with Governors and quality assured on Governance visits.

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Science Leader: Razia Juned

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