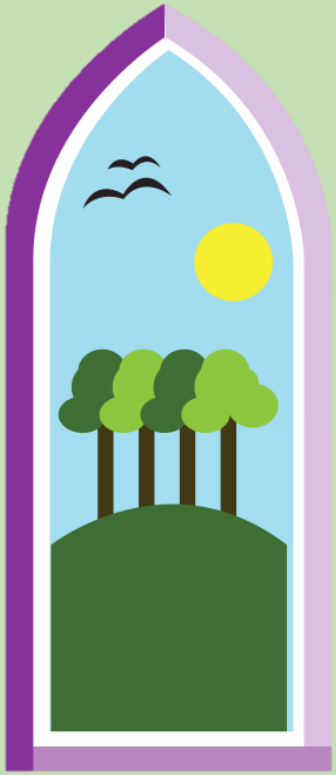
Science Intent



Strength in difference, together we are one, together we fly high

Intent statement

At Dunbury Academy, our intent is to enable children to become enquiry based learners. We encourage collaborating through researching, investigating and evaluating experiences. Children have a natural curiosity about the world around them and we encourage them to ask questions and work scientifically to further their conceptual understanding and scientific knowledge.

Children are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. It provides opportunities for the critical evaluation of evidence and rational explanation of scientific phenomena as well as opportunity to apply their mathematical knowledge to their understanding, including collecting, presenting and analysing data. Children will be immersed in key scientific vocabulary, which supports in the acquisition of scientific knowledge and understanding.

All children will be provided with a broad and balanced science curriculum which reflects the equality and diversity policies and practice in school.

Our vision of *strength in difference, together we are one, together we fly high* drives our science curriculum, aiming to develop a sense of ecological awareness, respect for the environment and our role as responsible citizens, where we can collaborate in our ambitions for the world and its future.

Science Structure

We organise our knowledge into key concepts

As scientists, we use these concepts to investigate.

Science

Science is the study of the physical and natural world through the testing of theories.

Biology

Plants
Growing plants
Plant reproduction
Classifying
Food chains
Habitats

Animals
Human body systems and health
Animal nutrition
Reproduction
Classifying
Food chains
Habitats

Chemistry

Properties of materials
Every day materials
And their suitability
States of matter
Rocks and soils

Changing materials
Changing, heating and cooling, twisting, pulling, stretching
Reversible and irreversible
Solutions

Physics

Earth and space
Seasonal changes
Day and night
Earth and moon orbits

Energy
Seasonal changes
Light
Electricity
Sound

Forces
Push and pull
Magnetism
Resistance and friction
Gravity
Gearing

Working scientifically

Pattern seeking
Observing, recording, analysing data. We use patterns found to make predictions, and conclusions.

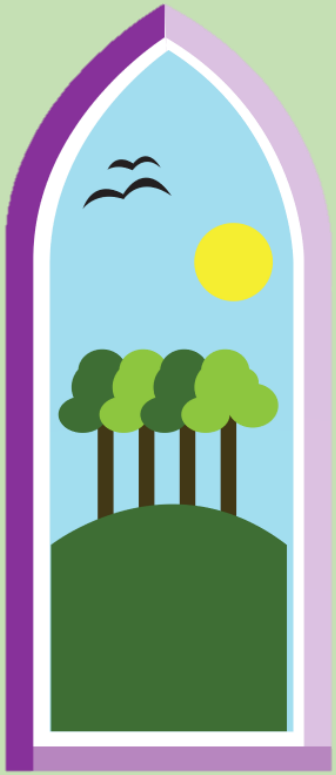
Observation over time
Measuring and observing changes and events. We use this data to help us understand scientific changes that have taken place.

Comparative and fair testing
Measuring and observing relationships between variables. We use this data to understand the cause and effect.

Identification and classification
The process of using differences to name something. Classification is organising things into groups. We use this information to help us make sense of how the world is organised.

Research
Learning from other scientists to help our understanding about structure and function.

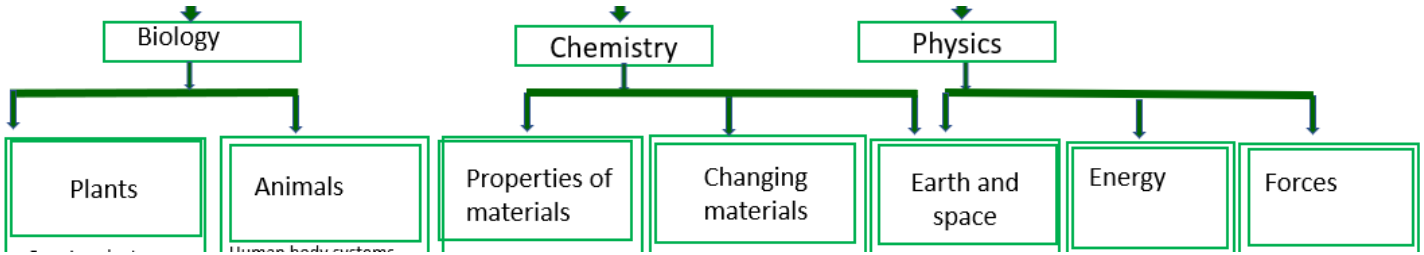
Science Concepts



Our knowledge is organised into key concepts and disciplinary concepts. The core knowledge is laid out in coherent, sequential progression documents which detail the end points which we aim children to achieve. The foundations for the science curriculum are laid in Early Years. This is built on in KS1 as novice scientists, leading to more expert scientists in KS2. This provides the firm building blocks for children to become discipline scientists in KS3 and beyond.

Key concepts

Key concepts support children in developing an understanding of their experience, a system of categorisation, and how they learn and use these systems. In this way, children build a schema of knowledge, giving children the confidence to ask searching questions about life and all aspects that feed in to it. Pupils learn that science is about working objectively, modifying explanations to take account of new evidence and ideas and subjecting results to peer review. Key concepts shape the overarching enquiry question for the spine. We have three main disciplines in science which sub divide into key concepts.



Our enquiry spines will seek to develop knowledge in both main key concepts, reinforcing the knowledge that science is about answering questions and developing a deeper understanding of factors to be considered when collecting, recording and processing data. They should evaluate their results and identify further questions arising from them.

	Strength in Self	Strength in Difference	Together in our communities	Together in our world	Be Heard	Be Aspirational
EYFS	Marvellous Me	Our Wonderful World	Let's Explore	Dinosaurs	Traditional Tales	Animals
	How have I changed? Staying Healthy	How does our weather change in different seasons?	How is day and night different?	What are herbivores, carnivores and omnivores?	How can I grow plants? How has the season changed? What changes can I see in animal life cycles?	
Years 1 and 2	How can we classify different animals? Year 1 PS	How do I know it is Autumn? Yr 1 PS	How do I know it is Winter? Yr 1 PS	Why are the properties of materials useful? Yr 1 PS	How do I know it is Spring? Yr 1 PS	What are the similarities and differences in the growth of seeds and bulbs?	How do I know it is Summer? What are seasonal changes?
	What are the main differences between adult animals and humans and their offspring? PS 2	How can I stay healthy? Yr 2 PS	How does changing a material change its usefulness? PS2		What do plants need to stay healthy?	What might happen if a habitat was changed by humans?
Years 3 and 4	Why is it called the Jurassic coast? Ps 3	How does an electrical switch work? PS 4	How many ways could I change a shadow? PS 3	How do forces help or hinder? PS3		Why do we have a digestive system? PS 4
	What should I eat and why? PS3		Why does temperature matter? Ps4	How can whales and dolphins communicate over long distances? PS4	Why are flowers attractive? PS3	Why is conservation important? PS4
Years 5 and 6	What are the different ways that light behaves? Ps6	How can we transfer energy from one source to another? Ps6	What are the 7 ages of man? PS5	(space of revision / deficit)	Why do offspring look like their parents??PS5	Why do we have a heart? PS6
	How can I change the properties of a material? PS5	Why are forces important? PS5	Why do we have day and night? PS5	What does survival of the fittest mean? PS6	How can we make sense of the diversity of life on earth? PS6	Revision / deficit space

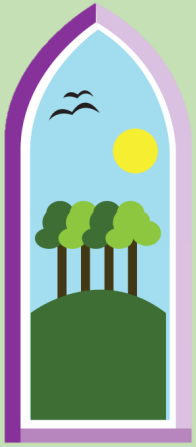
Science Concepts

Disciplinary Concepts

Our curriculum is driven by curiosity, language and resilience. Pupils at Dunbury are encouraged to be curious about science and use the disciplinary concepts (working as a scientist) to support their approach, asking themselves:

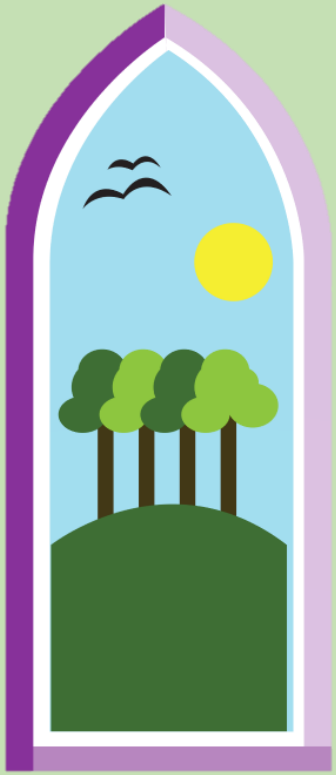
- What patterns do we see, and what predictions and conclusions can we make?
- What changes have taken place over time?
- If I change the variable, what will happen?
- What differences are there, and how can we organise things into groups to name them?
- What research is available to help us understand?

Disciplinary concepts shape the enquiry questions asked in a subject and organise the subject knowledge progressively. The disciplinary concepts drive the teaching sequence towards answering the overarching key question for the spine. They can all be applied across the entire subject and everyone is interconnected.



Pattern seeking	Observation over time	Comparative and fair testing	Identification and classification	Research
Observing, recording, analysing data. We use patterns found to make predictions, and conclusions.	Measuring and observing changes and events. We use this data to help us understand scientific changes that have taken place.	Measuring and observing relationships between variables. We use this data to understand the cause and effect.	The process of using differences to name something. Classification is organising things into groups. We use this information to help us make sense of how the world is organised.	Learning from other scientists to help our understanding about structure and function.

Science Skills



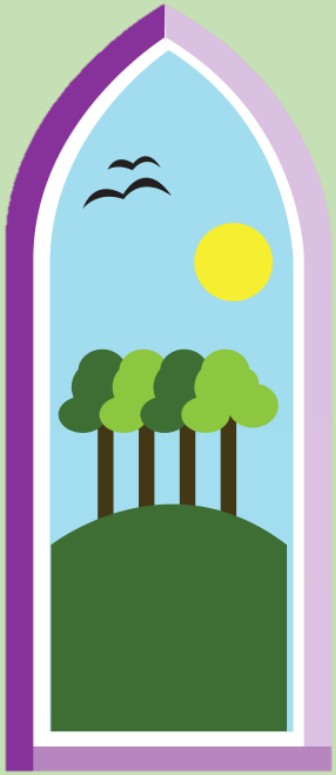
Science Skills

Children will be taught the scientific skills required to be an effective scientist.

They will learn to:

- 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
- select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables
- use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
- make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
- 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
- present reasoned explanations, including explaining data in relation to predictions and hypotheses
- evaluate data, showing awareness of potential sources of random and systematic error
- identify further questions arising from their results

Science Progression



Children in Early Years lay the first building blocks for scientific knowledge and concepts. Science at Foundation Stage is covered in the **'Understanding the World'** area of the EYFS Curriculum. It is introduced indirectly through activities that encourage every child to explore, problem solve, observe, predict, think, make decisions and talk about the world around them.

Novice KS1 → Expert KS2 → Disciplinary KS3 +

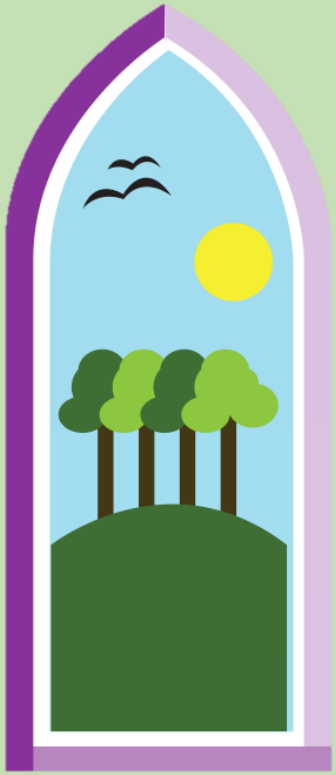
Novice

- Be curious and ask questions about what they notice.
- Develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information.
- Use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.
- Have first-hand practical experiences, as well as use appropriate secondary sources, such as books, photographs and videos to support their learning.

Expert

- Use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why.
- Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment.
- Make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately.
- Decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas.
- Use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.
- Use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time

Science Implementation



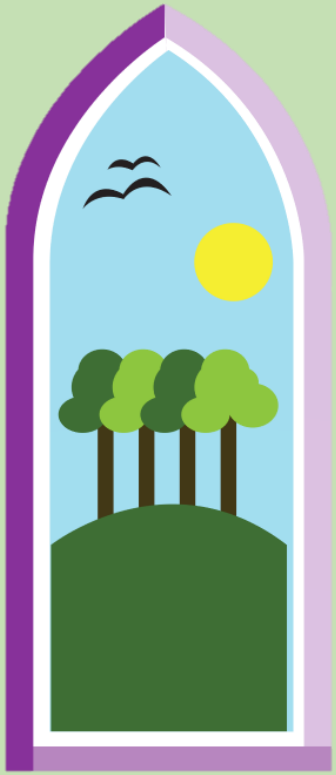
Planning:

Within the clear teaching sequence, individual lessons are designed around an enquiry question, which children are expected to be able to answer at the end of the lesson. Each lesson builds in small steps upon the previous, with prior learning referenced within the teaching sequence through a variety of means such as low stakes cumulative quizzing, structured talk and retrieval practice. This ensures that children are able to secure their learning in small steps, with teaching informed by continuous assessment of and for learning and misconceptions addressed at point in time. At the end of learning sequences, children use their accumulated knowledge to answer their key over arching enquiry question. Quizzes on essential knowledge are also sometimes used to support teacher understanding of their knowledge retention and to inform future planning.

Teachers plan lessons using a mastery teaching approach, driven by our curriculum drivers, following the sequence of learning indicated below:

Connect	Curiosity		Resilience		Spoken Language
Activate prior learning	Learning questions shaped the disciplinary concept.	Explicit instruction and modelling by teacher.	Guided Practice so that all children can access independent practice	Independent practice with tasks that match the learning question. Structured in small steps	Structured reflection for children to talk about what they know and their developing schema.
Recalling previous pertinent knowledge and building blocks.	How does this new knowledge fit into my existing knowledge schema? How does it build to my final application questions?	What do I notice? How does this connect and build on my knowledge? What new vocabulary am I acquiring. What questions do I have? Do I feel confident enough to have a go?	How am I doing? How do I know? Are there sufficient models, examples and resources to help me have a go?	I can apply new learning through practicing what I was taught, shown or modelled.	I can talk about what I have learnt today, using new vocabulary and generalisations. I can talk about where my new knowledge fits into the spine and how it is building me in this discipline.

Science Impact



Vocabulary

Vocabulary is an essential building block to enable children to access the curriculum; within science teaching sequences we use explicitly planned vocabulary to teach tier 2 and 3 vocabulary to all children. Teachers ensure that all children understand the key vocabulary needed to access the learning, with careful scaffolding for children with SEND. To support their vocabulary acquisition, the etymology and morphology of key vocabulary is also taught explicitly in our spelling lessons throughout KS2.

Adaption for children with SEND

Following the expectations laid out by the SEN Code of Practise, the following adaptations are made for individuals who need something that is addition to or different from others in the class. (click here for document)

Impact

At Dunbury, children's books show learning sequences that develop their scientific and conceptual understanding through a variety of rich tasks that make them think hard. Recorded work evidences snapshots of the learning sequence, with rich vocabulary, guided and independent work. Independent work shows the children's understanding of the lesson question and gives a snapshot of their learning throughout the overall lesson. Learning sequences show that over time, children know more and can apply this knowledge across their wider learning in science.

We use the laid out essential knowledge in the progression documents to set the standard that we expect children to reach by the end of EY, KS1, lower KS2 and upper KS2.