**Rationale**

**Pensans School seeks to explore the aims and objectives of the National Curriculum to form a basis of planning the science curriculum.**

Science in Pensans has an enquiry-based approach to progression across the school with the disciplinary and substantive knowledge set out through the United Curriculum progression documents which show progression from year 1 to Year 6. The United Curriculum has been adapted to fit Pensans’ 2 year rolling programme. Some topics have been moved to fit the 2 year rolling programme, ensuring that children have been taught prior knowledge. Eg ‘Plants’ are taught before ‘Plant growth’ to ensure children are building upon the vertical concepts.

The substantive knowledge we have chosen to focus on (in line with the National curriculum), is laid out clearly in knowledge organisers for teachers to refer to. The substantive knowledge is linked to the 10 key ideas of science. These concepts are ideas that are expressed in the form of narrative descriptions that build the understanding of key ideas from primary to secondary education. They cannot be understood in single units or lessons; but need to build concepts by learning them in small steps within the curriculum.

The taught substantive knowledge ensures there is breadth, balance, sequencing, depth and rigour.

Our disciplinary strands are the working scientifically element of science. Working scientifically is integrated into each topic and they are deliberately practiced in the context of relevant and appropriate experiments, and then reviewed at regularly intervals across the key stages.

The United Curriculum for Science has been adapted for Pensans by considering the context of our pupils and the community.

For example:

* Pupils learn about habitats, ecosystems, species (both plant and animal) that are found in our local area. This is incorporated into all units where the natural world is studied to include Y1: Plants, Year 1/ 2: Animals, Year 1/ 2: Living things and their habitats, Year 3/ 4: Plants, Year 3/ 4: Classifying organisms, and Year 5/ 6: Further classification.
* Pupils look at pictures of local rock formations, rock types found locally in Year 3: Rocks.
* Pupils learn about local sustainability initiatives such as recycling facilities in Year 2: Everyday materials and examples of renewable energy found locally in Year 6: Electricity.
* Pupils learn about extreme weather observed in our local area in Year 1/ 2: Seasonal changes.
* Pupils learn about foods that are grown in the local area in Year 1/ 2: Plant Growth

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| Intent |
| At Pensans School, our intent is to deliver a science curriculum which is accessible to all, inspires curiosity and that will maximise the outcomes for every child so that they know more, remember more and understand more. The children will learn through linking key vertical concepts (key ideas mentioned above). At Pensans, we teach substantive knowledge (by substantive knowledge we mean the knowledge linked to the 10 key ideas) so that our children can begin to develop clear understanding of certain facts. In our curriculum, substantive knowledge allows for:* Ensuring pupils master core content through the development of key concepts and timely revisiting of key knowledge.
* Sequencing the curriculum and selecting knowledge to allow for gradual development of vertical concepts – the ‘big ideas’ in science – to provide firm foundations for KS3.
* Preventing common misconceptions that are often formed at an early age and prove problematic at the later stages of pupils’ science education.
* Purposefully teaching appropriate knowledge that goes beyond the KS1 and KS2 national curriculum, to aid current and future understanding, and to smooth the transition to KS3.
* Encouraging pupils to apply and make connections between the disciplines of science, the wider curriculum and the wider world.

This is linked to and developed by understanding our disciplinary knowledge (working scientifically) knowledge throughout the topics. In our curriculum, disciplinary knowledge allows for: * Sequencing Working Scientifically elements so that they are explicitly taught and practiced alongside the substantive knowledge, and regularly reviewed and built upon across the years and key stages.
* Making deliberate and explicit links to other curriculum areas – particularly geography and mathematics.
* Planning practical tasks that have a clear purpose: to demonstrate or prove substantive concepts, or to allow pupils to deliberately practice working scientifically skills in a relevant context.

Throughout the teaching of the curriculum, children will answer quizzes on specific substantive knowledge about their current topic which will inform the retrieval sessions within lessons. At the end of a topic, children will ‘show what they know’ by answering the topic enquiry question – prompted by the lesson questions - using the knowledge they have learnt through each lesson in that topic or complete a topic quiz individually or as a class in KS1. Vocabulary and understanding vocabulary are major parts of our science curriculum. Within each topic, children will be learning new words, what they mean and how to use them. This vocabulary will be laid out clearly on each knowledge organiser so that teachers understand the importance of children understanding these definitions. This vocabulary, twinned with other words they will have learnt in topics before, will be used on command modules during lessons. |
| Implementation |
| We use progression grids (from United Curriculum) and our own knowledge organisers to ensure there is clear substantive knowledge, skills and vocabulary progression throughout school. Key vocabulary has been identified and included in each lessons command module. The skills of working scientifically are embedded into lessons to ensure that these skills are being developed throughout the children’s school career, building on prior knowledge. Vertical concepts are used within lessons to connect aspects of learning. For example, in Year 1/ 2 pupils learn that different objects have a specific purpose, in Year 1/ 2 they learn that objects are made from different materials because these materials have different properties which make them suitable for a different purpose and in Year 3/ 4 they learn that some of the properties of different materials can be classified as chemical or physical.Disciplinary knowledge (working scientifically) is taught within topics to pupils and carefully sequenced to ensure pupils are provided with opportunities to practice these skills throughout the curriculum. There are also opportunities for writing, through ‘show what you know’ and in some topics there are opportunities for children to write as scientists. **Structure of a lesson****Recap/Retrieval –** Each topic will start with a photo/ picture linked to the topic. EG. This could be a plant with missing labels in a plant topic, an electrical circuit in electricity. What do we know already and where does it relate to other scientific areas?Next, the lesson should relate to what has been learnt on this topic so far – not just last lesson. How will it apply to this lesson? Look for connections between all the lessons and the overarching enquiry question.**Expectation –** Explain the learning question and what is expected by the end of this lesson, this is what you need to be able to show/tell me. How does today’s question relate/effect the over-arching enquiry question?**Teaching –** Teachers demonstrate how to use scientific equipment and students become more proficient in selecting and using equipment, collating and interpreting results; and they become increasingly confident in their growing ability to come to conclusions based on real evidence. Formative assessment will be taken place throughout the lesson through the questioning and discussions.**Individual learning –** Children will display learning in their books in a variety of ways. Some of these will be dictated by the teacher – during experiments, and in other lessons children will be able to express their knowledge in their own way through which can include annotated diagrams or writing etc. **Plenary** – This is done in a variety of ways in science. From quizzing, to reflecting on their own learning through discussions; either way, children will be reminded of the substantive knowledge and disciplinary concepts from the learning.The individual learning in each lesson serves as a constant assessment tool to inform the teacher where to move the children onto next and what retrieval will be needed in future lessons. **Adaptations –** Adaptations are made for some learners so that they can display their learning. This could be through a variety of ways such as diagrams, group work or voice recordings on ‘Vocaroo’. Children in year 5/6 also use Ipads to demonstrate their learning and have used videos and editing to show what they have learnt.  |
| Impact |
| **By the end of each school year -** * Children will be able to discuss science with passion and understanding
* Be subject to full coverage of the science National Curriculum.
* Be provided with engaging experiences and develop skills that prepare them for the future.

**In Pensans we assess children in a variety of ways -** * Formative assessment opportunities take the form of pupil questioning and observation of skills in each lesson. Teachers can check understanding so they can fill gaps and address misconceptions as required.
* Children will complete an end of topic quiz. These give teachers an understanding of the knowledge that pupils can recall at the end of the unit, and can be used to identify any remaining gaps to be filled.
* The assessment opportunities inform teacher judgements around what a pupil has understood in each science unit. Knowledge and skills are assessed at the end of each unit to ensure impact of provision.

**Subject leader monitoring following the subject action plan through -** * Lesson walkthroughs
* Book scrutiny
* Pupil conferencing
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