Amport CE (Aided) Primary School

COURAGE COMPASSION RESPECT
Intent Statement
SCIENCE

Intent

For all children to operate as scientists, engaging in rich scientific problem solving.

IMPLEMENTATION	RATIONALE FOR IMPLEMENTATION	IMPACT
Emphasis on scientific problem solving in lessons. We teach science to 'do science'. Teachers use the HIAS learning journeys to plan a range of problem-solving activities throughout the curriculum. These include: • using scientific ideas to predict what might happen • using scientific ideas to hypothesise why something happened • planning experiments to find out what happens	Problem solving is the driving force of our science curriculum. We understand that children learn best when they engage in scientific problem solving. We therefore teach scientific knowledge in order to problem solve with it. Hampshire Learning Journeys are an interpretation of the NC which promotes opportunities for children to work as scientific problem solvers. As a school we recognise that children have	Children are actively engaged in rich problem solving tasks and there is evidence of children 'doing science' in lessons (rather than just learning facts). Teacher's planning includes a range of problem solving activities, enabling children to find the answers to a wide range of questions for themselves. Children have the scientific skills and tools to find answers to scientific questions. Children draw upon familiar scaffolds when planning

• drawing conclusions from evidence about what happens When planning, teachers use the Hampshire Learning Journeys based on rich scientific problem solving and the HIAS planning format to show clear substantive knowledge, clear investigative tasks and clear working scientifically. Children are explicitly taught scaffolds to support them when planning and carrying out scientific investigations including: • Sketch graphs • Diagrams to annotate • Planning Mind map • Conclusion vocabulary cards and sentence structure These are modelled progressively so that children can apply them with increasing independence. The science leader works with teachers to plan the teaching of substantive knowledge and the use of problem solving activities, including the use of scaffolds (how and when to use). Children are actively involved in the planning	lots to consider when solving scientific problems: looking at what is happening, thinking about what they already know, and considering what the new meaning tells them. Through Working Scientifically children are able to: Organise and record their threads of thinking. Use their working memory effectively. Develop explanations and draw conclusions from data. Working Scientifically is: A dialogic tool between pupils and between pupils/ teacher as they work out the best methods and measurements. Which is most appropriate? Through Working Scientifically, children to get straight on with the Science. They are also able to: Consider alternative approaches Evaluate different approaches Refine and change their ideas. **The planning mind map is a thinking process tool and a decision making tool.**	and carrying out investigations. **Evidence of problem solving in books:** Children use key ideas and apply their substantive knowledge to make predictions and make hypotheses throughout the curriculum and in longitudinal studies. Children use the planning mind map to plan and carry out investigations involving '*How does a affect b?' This looks different throughout the Year groups.* In Years 1 and 2 Children draw conclusions from their data. In Years 3 and 4, children demonstrate that they have sought to control variables. In years 5 and 6, children evaluate the quality and reliability of their data. Children work scientifically at the appropriate level and progression is evident in books. ARE expectations are explicit for teachers. Teachers will use children's scientific recordings to assess both working

and carrying out of scientific problems by use of the planning mind map. They work out how to carry out investigations: • What will I change? • What will I measure? • What will I keep the same? Children problem solve by using key ideas to puzzle out what might happen or what has happened. Children work as scientists, investigating questions they do not already know the answer to. Children's recordings are purposeful. They record as scientists. They include annotations of ideas and thinking. Recording allows children to change tact. Children decide how many results to record. Insight assessment is completed by the class teacher after each unit and identifies children's attainment in both subject knowledge and Working Scientifically.		scientifically and subject knowledge. Children's scientific thought processes are made clear through annotations and scaffolds. Children have ownership over the planning and carrying-out of investigations. Annotations show they have considered the best possible methods and measurements when working scientifically.
Intent **For all children to develop deep, meaningful and memorable scientific knowledge and understanding**		

Implement **What actions will be taken to address this?**	**Rationale for implementation**	**Impact** **What is the impact? How do you know?**
School has clear principles for science. We teach science to: • Do science • Bring memory Curriculum map outlines the coverage of all units and ensures progression of key scientific ideas throughout KS1 and KS2 HIAS units are organised to develop knowledge and understanding throughout the year groups New knowledge and skills build upon what has been taught before Science is taught weekly across KS1 and KS2. This allows children to deepen their understanding of key ideas and allow sufficient time for children to master the curriculum Hampshire Learning Journeys are used - What is to be taught (knowledge and understanding and key ideas) is	The units on the curriculum map match the Hampshire learning journeys which: • Define precisely what is to be taught in each unit and give teacher's precision (not just any old knowledge) • Make each idea clearer, leaving less to be inferred • Group together key scientific ideas from the National Curriculum into sensible units • Make key scientific ideas explicit • Sequence ideas in such a way that one idea builds upon another / ideas are related to one another more clearly. This promotes progression in knowledge and understanding Children master their knowledge and understanding by applying this to a broad range of challenging problems	Children are able to clearly articulate their scientific knowledge and understanding during units and at later dates HIAS Assessment booklets indicate that children have remembered their learning Evidence in books shows that key scientific ideas are applied rigorously Planning indicates that teachers plan a logical sequence of lessons where scientific ideas and substantive knowledge are related and progressively build upon one another

clearly defined for teachers. Through using the HIAS planning format and the HIAS Progression of Substantive Knowledge documents that track each unit across KS1 and KS2, clear substantive knowledge is planned and subsequently taught Teachers use the problem solving model to consider: • What precisely do I want the children to understand/know/remember? • What application problem will require this knowledge? We make learning memorable by planning opportunities for children to embed their knowledge and understanding through problem solving Children are encouraged to re-visit scientific ideas in units and at later dates through the use of retrieval tasks both monthly and weekly reviews Teachers assess whether children can apply key scientific ideas logically and accurately to new problems/ situations Teachers use HIAS Assessment booklets to ensure that children's knowledge and understanding is secure. These booklets are used after the completion of each science unit	We teach children to remember it (embedded learning rather than superficial learning) The purpose of learning journeys is for more children to 'get the knowledge' and for more children to remember it Through challenging problem solving, children develop a deeper understanding of scientific concepts and have more secure memories of the learning. Ideas are applied to tackle challenging problems. Our problem solving approach allows children to apply their scientific knowledge rigorously Re-visiting ideas - we recognise that science units are discrete and so we therefore use retrieval tasks to revisit knowledge and understanding	

Children research using secondary sources to develop their knowledge and understanding Good quality reading books for science displayed and used by children to support their knowledge and understanding. Children read at an age appropriate level to carry out scientific research and find answers to their questions Sequencing of curriculum map makes links with other areas of the curriculum to deepen understanding e.g.: • KS1 Materials - Toys history • KS2 Controlling Electrical Circuits - DT electrical board games The Science curriculum makes links with maths - recording, presenting, analysing and interpreting data Emphasis on talk in lessons provide opportunities for children to use and develop scientific vocabulary and articulate their scientific understanding Children use scientific language to communicate and record their findings in different ways both in books and verbally Visits are planned as appropriate to support children in developing knowledge and understanding e.g.:		

• visits to gardens to identify plants Children work towards clearly defined end points i.e. lots of units leading up to Evolution and Inheritance Teachers have good subject knowledge and spend time researching topics. TAs have expertise in plants and local environment and are used to support teaching and learning in KS1 Teachers check knowledge and understanding with the science leader (support for staff from subject leader) Children in EYFS experience materials, seasonal changes, plants, animals and forces which are the building blocks for the KS1 curriculum Assessment data analysed by the science leader and class teacher to determine gaps in children's knowledge and understanding and how these could be addressed		

Intent **To develop children's inquisitive minds, to foster their curiosity, and to promote their sense of awe and wonder**

Implement **What actions will be taken to address this?**	**Rationale For Implementation**	**Impact** **What is the impact? How do we know?**
We use the Wonder Wall approach where children generate their own questions in response to engaging stimuli Children's curiosity is nurtured by encouraging them to raise their own scientific questions which are answered in different ways: • Teachers respond to questions in lessons • Children respond to each other's questions in lessons • Children ask experts or carry out scientific research to find out answers • Children set up investigations to answer questions • Children are encouraged to raise further questions in response to investigations Lessons are planned in response to questions where possible Teachers research topics in depth in preparation for children's questions EYFS - exploratory play and planning for different investigations facilitates opportunities for children to ask questions and explore the answers for themselves	We understand that children's curiosity is expressed as questions and that questions are at the heart of science, so we encourage children to generate their own	Children ask lots of interesting questions and find out the answers in different ways - evidence of Wonderwall Children enjoy sharing the new things they have found out Children feel empowered to decide what they would like to find out and have a sense of ownership over their learning

Intent **For children to enjoy and be motivated by real and purposeful science**		
Implement **What actions will be taken to address this?**	**Rationale for Implementation**	**Impact** **What is the impact? How do you know?**
Children engage with science through enjoyable, hands-on practical experiences; they experience and observe real life scientific phenomena Using HIAS learning journeys, teachers plan well thought-out, challenging problems and consider the things which make a good question: • the child must not know the answer already • the child must want to know the answer • finding out the answer must require the application of the knowledge or skill we are trying to help the child master (there is always a purpose for scientific investigation) Studies of plants and animals are relevant to the children e.g. what food chains exist on	Enjoyable hands-on investigations promote children's sense of excitement and inquisitiveness about natural phenomena	Pupil conferencing indicates that children enjoy science and see it as opportunity to find out something new. Children talk enthusiastically about science and there are high levels of enthusiasm in lessons Children enjoy sharing what they have found out (often talk to other teachers about their leaning) Children are able to relate science to their everyday lives Work samples indicate that the questions children tackle are challenging and purposeful. They enable children to embed their understanding

The Green (things the children will encounter and therefore has meaning to them) Children are given opportunities to learn something new/follow up their own lines of enquiry - link with Wonder Wall. Children in the EYFS are given plentiful opportunities to explore and ask questions about scientific phenomena through interesting stimuli as part of continuous provision (investigation area - magnets, materials, magnifying glasses, floating and sinking etc.) High quality resources are used in lessons to motivate and engage children		

Intent **For children to develop a deep understanding of their local environment.** **For children to understand the significance of science for the world today and for the future.**		
Implement **What actions will be taken to address this?**	**Rationale for implementation**	**Impact** **What is the impact? How do you know?**
Longitudinal studies undertaken in Years 1-4: • Children visit the local area frequently throughout the year to make observations of subtle seasonal changes and how they affect the plants and animals living there • Are mapped onto the curriculum for each year group, promoting progression i.e. • Children apply their scientific understanding throughout long term studies to deepen their understanding of living things and their habitats. They use key scientific ideas to make predictions and explain why they think changes are happening • Children work scientifically through observing, measuring and recording data (including the weather) and concluding their findings. The EYFS curriculum map includes topics on the changing seasons in preparation for longitudinal studies in KS1. Children are given an opportunity to investigate how	We understand the role of science in nurturing our pupils' awareness and respect for nature Long term studies are a real and exciting first-hand experience of investigating the local environment By regularly working in the local area, children begin to make sense of how seasonal changes affect the plants and animals around them. They also develop an understanding of how humans can have both a negative and positive impact on the environment Long term studies foster children's concern for the environment and provide an opportunity to actively care for it at a time when we are becoming increasingly aware of extreme weather events	Children enjoy regularly working outside in the local environment and have a deep knowledge and understanding of the plants and animals that live there Children can identify a range of plants, animals and trees in the local environment and explain how they change as a result of seasonal changes or human activity Children are able to talk about the ways we can all help look after the environment Children develop an appreciation of our planet and a deep sense of moral responsibility for the environment Children develop an awareness of

nature changes as a result of what we do –Year3/4- encouraging animals into a habitat/ leaving pots of soil to see what grows there. At the start of each study, children consider the ethics of working outside in science and consider how to take care of plants and animals - deepening their understanding of how we can have an impact on the environment. Each longitudinal study begins with the children devising their own Code of Conduct. Children's understanding of the environment and global issues is further developed through collective worships - global warming, plastic in the oceans and geography topics etc.	and the impact humans have on the environment, it is important that our children have developed the scientific ideas, skills, confidence and first-hand experience that will allow them to engage fully with the real problems facing our planet By developing an understanding of their own local environment, we hope to help children prepare for the more complex challenges facing them in the future: • global warming / climate change • rising sea levels • loss of habitats • pollution in the land, air and sea etc	the global issues facing our planet are fully prepared to act as responsible citizens for the future

Intent **For children to work in a safe manner, in a safe environment and develop their ability to manage risks.**

Implement What actions will be taken to address this?	Rationale for implementation	Impact What is the impact? How do you know?
All teachers have a log-in for CLEAPSS and for every unit, teachers use CLEAPSS for Health and Safety. They refer to the Hampshire 'keeping safe in science' safety cards if relevant. Health and Safety is clearly shown on medium term planning and on teacher powerpoints. Opportunities to discuss safety considerations with children are planned for in units and clearly shared on teaching powerpoints with the class and any support staff. Children are encouraged to discuss the ways they will keep safe. What are the risks? How can we manage the risks? Teachers complete a science risk assessment each time they work outside of the classroom. This is shared with the children. The science leader and class teachers ensure that all resources and equipment are of a high quality and safe to use. Teachers demonstrate how to use equipment safely and	To provide high quality experiences to explore science without compromising children's and adults' safety	Children work safely in our school and are involved in the identification and management of risks both in and out of the classroom Children use high-quality resources safely in lessons Children are able to talk about the ways they keep safe in science

appropriately. Science leader to email teaching staff CLEAPSS termly Explore Magazine, which includes current safety advice for certain topics. CLEAPSS folder on Shared Resources contains Health and Safety guidance but teaching staff and responsible to check and keep abreast of current advice Safety audit completed by science leader and head teacher annually.		

Intent **For all children to achieve, be successful in science and be ready to move to the next stage of their learning**		
Implement **What actions will be taken to address this?**	**Rationale for implementation**	**Impact** **What is the impact? How do you know?**
Teachers assess children's understanding during lessons so that those who do not understand scientific concepts are supported and able to engage with quality scientific problem solving Teachers use precise questioning to check children's	Our aim is that all children will work scientifically and develop long-term scientific understanding	High percentages of children achieve ARE in science Assessment systems are effective for teachers and are a useful tool in

conceptual knowledge and understanding. This ensures they are ready to apply their ideas Variation in lessons ensures that children are kept up to speed. Approaches include adult-support, focussed and deliberate questioning and paired/group time. Where appropriate, teachers problem solve alongside children so that all children can share similar experiences regardless of their starting points Assessment of working scientifically is completed after children have had experience of the assessment strand through teaching explicitly and modelling HIAS Assessment booklets are used at the end of a topic to check children's scientific knowledge and understanding. Assessment throughout the lessons and from HIAS Booklets informs retrieval tasks both weekly and monthly and are quite fluid depending on need		ensuring that all children have the best opportunity to achieve ARE or above Children are ready to move onto the next stage of their learning