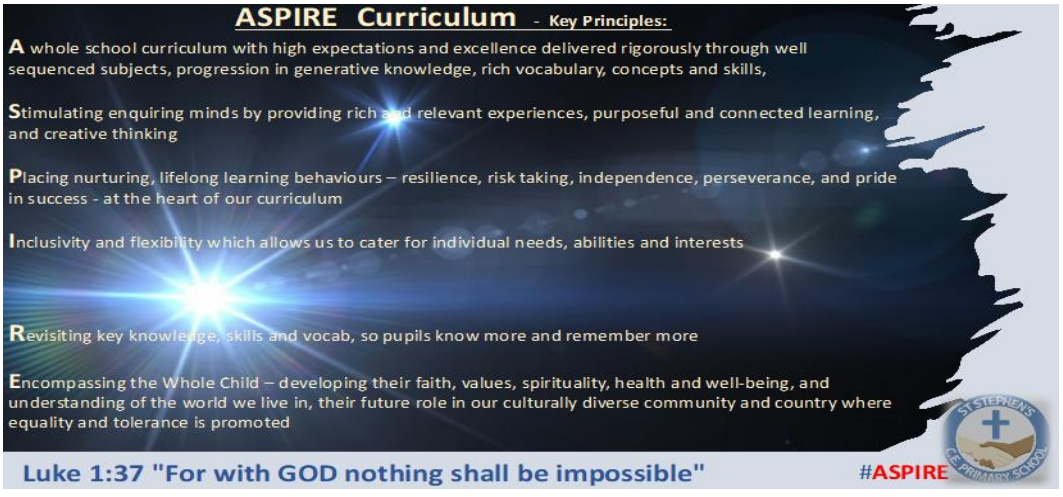
SCIENCE POLICY

At St. Stephen's C.E Primary School, our Christian values run through our school like a *golden thread* and enable our children to flourish and ASPIRE in life.

Our Christian vision: '*For with GOD, nothing is impossible*' (Luke 1 : 37) helps support and guide our whole school community in striving to beat our previous best endeavours.

Throughout the year, we refocus on a Christian Value in order to keep God in the centre of our lives. By linking these to key events within the Christian calendar, our children will all take turns in leading key Collective Worships for our whole school community at St. Stephen's Church once a year.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Thankfulness	*Respect*	*Hope*	*Forgiveness*	*Love*	*Trust*



The key principles of our ASPIRE vision support our decision-making process at St. Stephen's C.E Primary School for the curriculum.
With these principles in place, our children are able to know more and remember more across development of our broad and balanced curriculum.

Our *'Aspire Curriculum'* Key Principles:

A whole school curriculum with high expectations and excellence delivered rigorously through well sequenced subjects, progression in generative knowledge, rich vocabulary, concepts and skills.

Stimulating enquiring minds by providing rich and relevant experiences, purposeful and connected learning, and creative thinking.

Placing nurturing, lifelong learning behaviours – resilience, risk taking, independence, perseverance, and pride in success - at the heart of our curriculum.

Inclusivity and flexibility which allows us to cater for individual needs, abilities and interests.

Revisiting key knowledge, skills and vocab, so pupils know more and remember more.

Encompassing the Whole Child – developing their faith, values, spirituality, health and well-being, and understanding of the world we live in, their future role in our culturally diverse community and country where equality and tolerance is promoted.

What is science?

1 Introduction

A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

2: Intent

Our science curriculum is designed with the intent that each child at St. Stephen's C.E Primary School will become competent scientific thinkers and investigators who will encounter awe and wonder through first-hand scientific investigative experiences and approaches, which activate learning for all children. With great emphasis on providing children with a high-quality science education that offers the foundations for understanding the world through the specific disciplines of biology, chemistry and physics, our curriculum design for Science across primary school promotes specific competences including knowledge, enquiry and the working scientifically based skills. Creative pathways to learning are planned for so that children can make links to prior learning and develop depth in key skills within Science that are rich, stimulating, challenging and real life with the aim of enabling children to master learning with skills, knowledge and experiences that will remain with them for the rest of their lives. We should all champion primary science and our intent is to make sure that every child has a positive experience of science throughout their primary school education.

3: Implementation

- The schools medium-term planning and coverage of key scientific skills will be used by teachers to plan, this will drive the journey of Science for every year group, building on from prior learning and develop progressively key skills and developing depth.

- Provide opportunities for children to develop the process skills associated with science education as well as develop a greater knowledge and understanding of life processes and living things, materials and their properties and physical processes as described in the National Curriculum for science.

- Promoting enjoyment and enthusiasm for learning through real, first –hand and rich science experiences so that all children explore, question, predict, plan, carry out and make observations and conclusions about their scientific tests.

- Allowing children to discuss and present their work using scientific language, observations, diagrams, jottings and charts.

- To foster positive attitudes such as curiosity, perseverance, willingness to use and appraise evidence, willingness to tolerate uncertainty, critical reflection and enthusiasm.

- Developing an understanding of the importance of Science in everyday life.

Science will be taught weekly in each half term, within each year. The objectives are taken directly from the National Curriculum. We revisit these objectives to support retrieval of the knowledge gained and build on and consolidate learning. The subject leader, alongside class teachers and the Curriculum lead have developed a bespoke curriculum, personal to the children from our school, to ensure breadth and coverage. Unlocking tasks may be set before the start of a new topic for homework. This task will inspire children's thoughts about the area/unit and encourage additional research and conversations about their learning at home.

The children will have a knowledge organiser at the beginning of each topic, to show the specific science knowledge that they will learn throughout the topic.

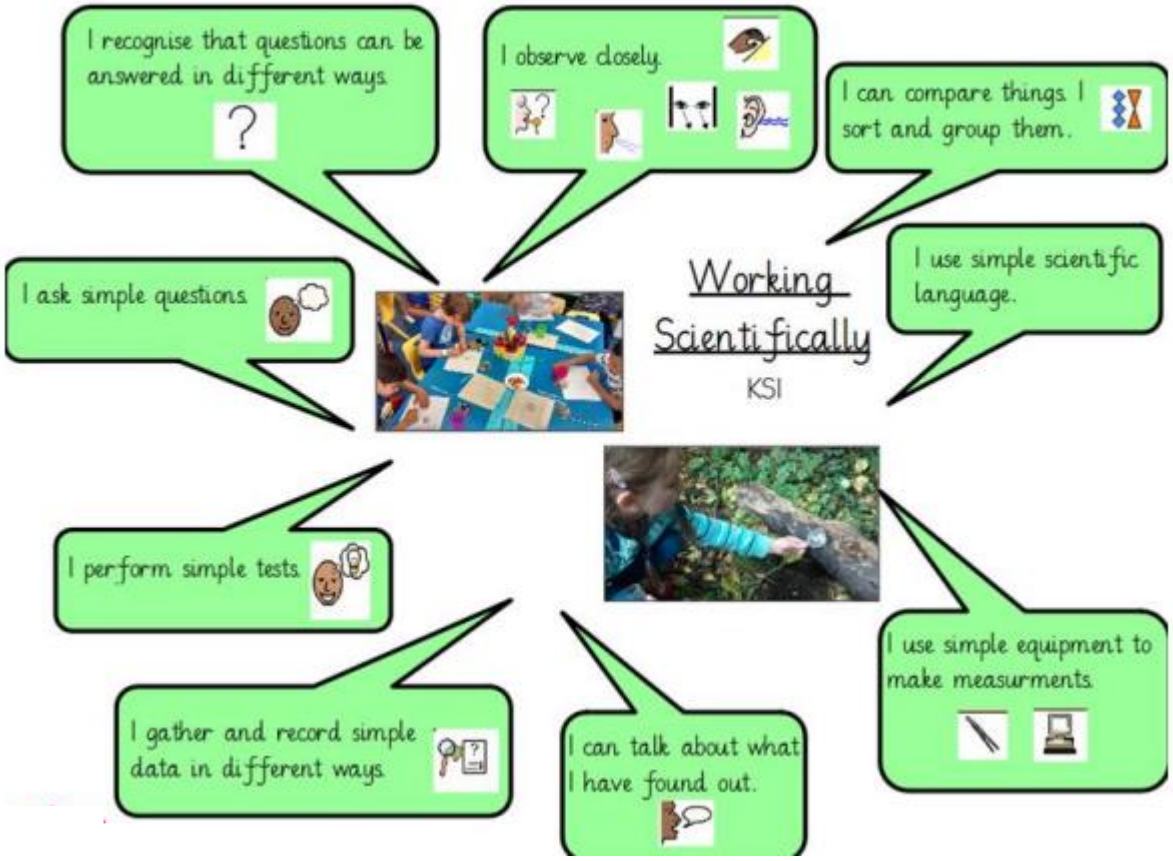
The knowledge organiser will also be added to the half termly newsletter for each year group so that parents can access this and encourage their children to deepen their knowledge outside of school.

During lessons in the medium-term plans have been sequenced to ensure that

In Key Stage 1:

The principal focus of science teaching in Key Stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to 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. They should begin to 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. Most of the learning about Science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.

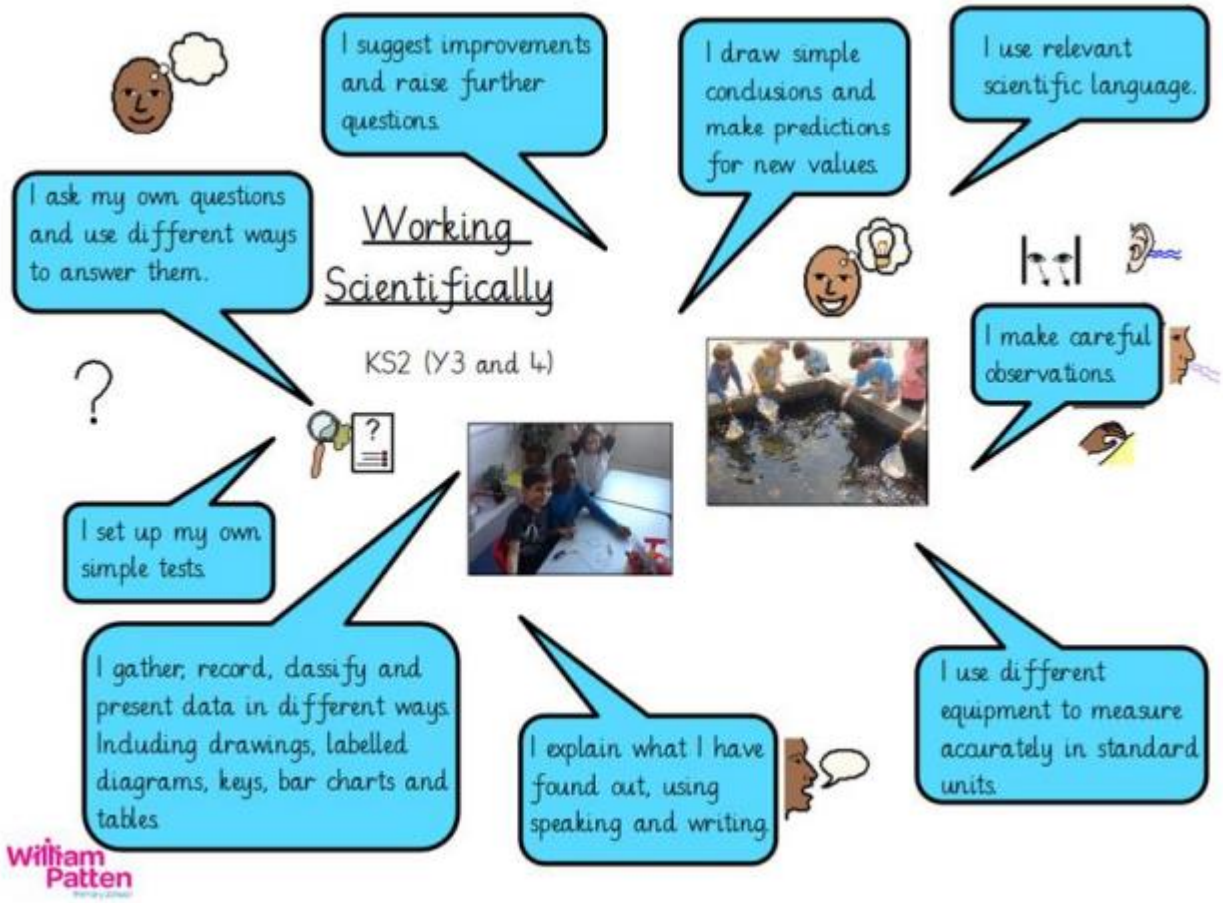
'Working scientifically' is described separately in the programme of study; however, it must always be taught through and clearly related to the teaching of substantive Science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at Key Stage 1.



In Lower Key Stage 2:

The principal focus of science teaching in Lower Key Stage 2 is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

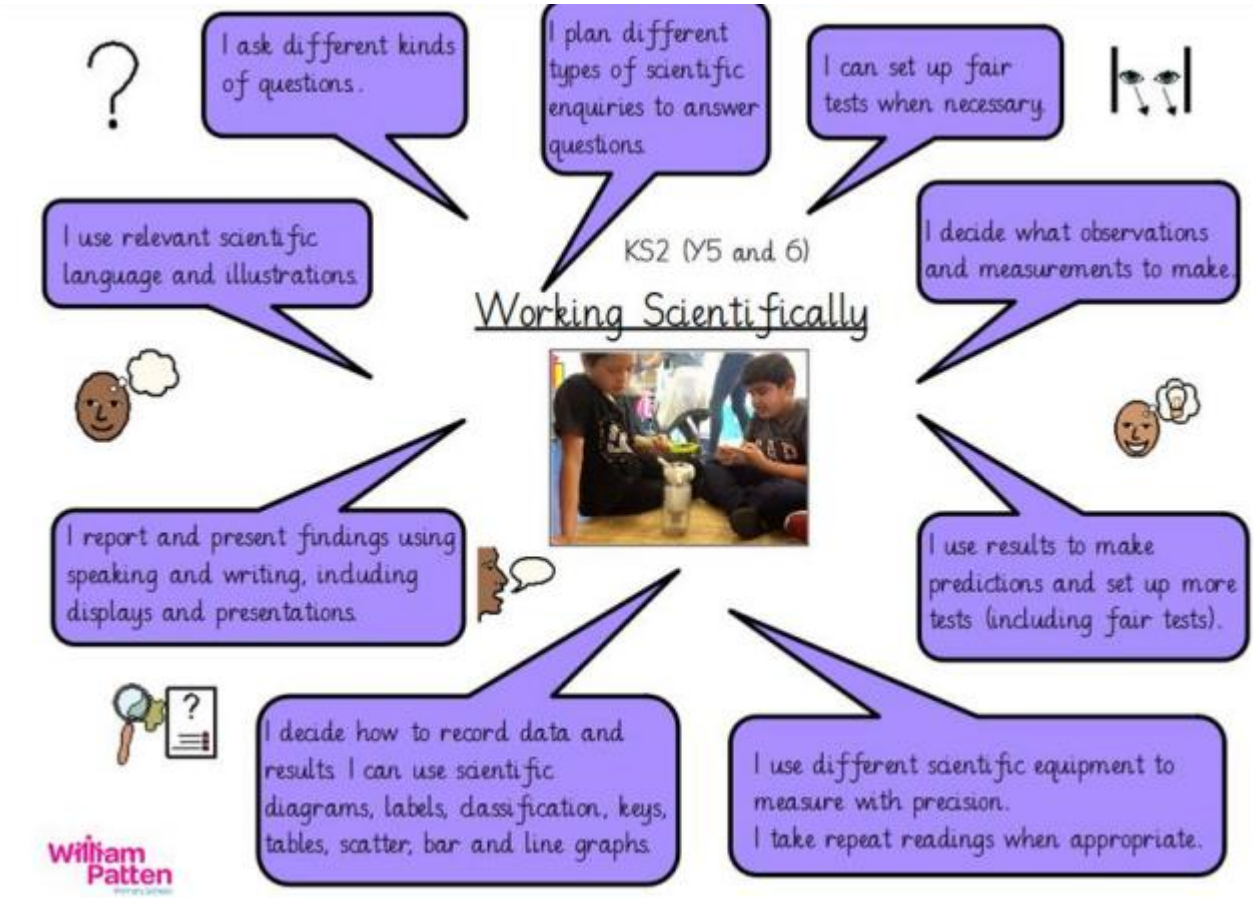
'Working scientifically' is described separately at the beginning of the programme of study; however, it must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.



In Upper Key Stage 2:

The principal focus of science teaching in Upper Key Stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At Upper Key Stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.

'Working and thinking scientifically' is described separately at the beginning of the programme of study but must always be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content. Pupils should read, spell and pronounce scientific vocabulary correctly.



Planning:

Teachers are expected to annotate their MTPs and refer to them from lesson to lesson. Specific annotation will include personalised adaptations for all SEN, EAL and Pupil Premium children, a plan for the TA and their role, an evaluation and next steps by the teacher and TA from their observations of the lesson- for every lesson.

Presentation:

In all year groups, the Learning Objective must start with an *'I can...'* statement for all lessons.
Children in KS2 are expected to write the long date in their books.
DUMLUMS must be used in every lesson.

Lesson structure:

Teachers will cover the 5-part lesson for the lessons just like in all other subjects.

Step 1: 'Review and Do' – Children will respond to the marking in their books from the previous lesson using their purple pen/pencil.

Step 2: 'Retrieval Practice' – Children to answer retrieval practice questions based on last lesson, previous unit and previous year.

Step 3: 'Hook' – Using hooks such as images on Explorify to engage the attention of learners.

Step 4: 'Guided practice' – Led by the teacher. This can be explaining new learning or the modelling of a practical experiment.

Step 5: 'Independent practice' – Children then undertake investigations and have the opportunity to explain their learning.

An important part of the Science curriculum is the ability to retain and re-use knowledge, vocabulary and skills in a progressive and developmental way throughout the journey through school. Retrieval practice takes place within each lesson. It is created to re-visit key areas from the unit being covered and also other previous units for the children. It would be expected that children will receive retrieval questions explicitly from the Knowledge Organisers from the units. Teachers will use this as a teaching assessment tool too as it will show the understanding and retention of the key information taught. Retrieval practice will see more able children challenged to show their ability or gaps e.g. A GDS child in Y2 would be expected to show that they are capable of retaining more complex knowledge.

At the end of the unit, the children complete an extended retrieval quiz. In the Spring and Summer term, this is in addition to an end of unit extended writing piece, to demonstrate the knowledge gained over the half term. For our pure SEND children, we have realised through monitoring that the final assessment in some topics is not effective in illustrating the progress that these children have made. As a staff, we have decided to look at the *'Mind Map'* approach for the SEND children to convey the progress they have made throughout the topic.

Summative assessment

To use summative assessment effectively, class teachers will complete their assessment grids after the impact task. Dependent upon the impact task, class teachers will work collaboratively with the subject leader to agree and create a benchmark for the cohort at WTS/ EXP and GDS. This will inform a judgement as to whether the child is working towards, expected or greater depth.

Support for SEND

At St. Stephen's, we aim to meet the needs of all our children by differentiation in our science planning and in providing a variety of approaches and tasks appropriate to ability levels. This involves providing opportunities for SEND children to complete their own projects, with support, to develop speech and language skills, as well as scientific skills and knowledge. This will enable children with learning and/or physical difficulties to take an active part in scientific learning and practical activities and investigations and to achieve the goals they have been set. Some children will require closer supervision and more adult support to allow them to progress whilst more able children will be extended through differentiated activities. By being given enhancing and enriching activities, more able children will be able to progress to a higher level of knowledge and understanding appropriate to their abilities. motivate all learners, ensuring that optimum progress is made throughout each part of the lesson.

We support children with prior access of Knowledge Organisers to find key facts to use in their work. We provide opportunities to teach key vocabulary from the Knowledge Organiser to support the children's understanding of scientific vocabulary. To cater to the needs of all pupils, staff may provide differentiated support in lessons. This is annotated onto the teacher's medium-term plans. It is important to extract relevant information from the knowledge organisers to support the achievement of the specific learning objective.

A pupil's English ability should not be a barrier to their Science knowledge, skillls and understanding; therefore, we feel that at times it is necessary for pupil to verbalise their responses, have their work scribed when appropriate.

Children, who have been identified as having gaps or misconceptions in their learning, may be subject to additional intervention to bridge gaps.

After specific monitoring of SEND pupils, as a school, we realised that children were not achieving in their retrieval practice at the start of the 5-part lesson. SEND children will still complete a retrieval exercise but this will be differentiated to their level.

Examples of how pupils with SEND are supported:

- Every lesson begins with retrieval which supports links to prior learning.
- Vocabulary and knowledge from previous topics and year groups is revisited each lesson.
- Support with understanding and use of practical movements/ visuals.
- Extra teacher/ TA support.
- Children may be placed in mixed ability groups and talk partners to provide positive role models.

Examples of how Greater Depth pupils are challenged:

- Applying the learning and vocabulary with a great level of independence and accuracy.
- Differentiated, challenging work is created.
- Extension activities prepared and given to children as a challenge.

4 Impact

At the end of the unit, teachers deliver an assessment task to give children the opportunity to share their knowledge from that topic. The impact tasks involve an extended end of unit quiz to recall facts and knowledge. They are assessed against National Curriculum objectives to be working towards the year group expectation (WTS), working at the expected standard for their age group (EXS) or working at greater depth (GDS) within Science. Staff input the children's initials on their year group assessment document (found on the shared drive). This is used to formulate an end of year judgement for the child's summative assessment, recorded on the pupil's end of year report.
Any photographic and video evidence (*practical lessons, science experiments etc*) should be saved in the shared area as evidence for assessment. This needs to include the date, the activity, the initials of children. The teacher uploading this is responsible for deleting it in line with GDPR timescales (12 months). Pupils can also be assessed against their retrieval of the Knowledge Organiser.

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5: Equal Opportunities

The Governing Body and School Staff are committed to ensuring that all members of the School Community are treated fairly and with equality. We will comply with relevant legislation and implement School policy in relation to race, equality, disability equality and gender equality. In Science, the children are exposed to the diverse and multi-cultural world in which we live in. They are taught to respect differences in people, places and communities. We provide a quality education that is inclusive and equips our children to be lifelong learners. We encourage confident, caring and respectful citizens at all times.

6: Pupils' Records of work

Pupils record their work in their Science book. The work is expected to be of the same standard as that in English and Maths books. Any experiments and practical lessons can be recorded using photographs and videos and added to the Teacher's shared drive.

7: Resources

Resources are kept both in a central store for use when appropriate. Teachers are responsible for ensuring that risk assessments are in place for their activities and that equipment is prepared and ready for their lessons to ensure maximum lesson length is gained on all occasions. Damaged, lost and broken equipment must be immediately reported by email to Science Lead and caretaker by the teacher taking the lesson.

8 Strategies for the teaching of Science

We use a variety of teaching and learning styles in our Science lessons. These include...

Inquiry-Based Learning

- *Encourage curiosity:* Designing lessons where students ask questions and explore ideas rather than passively receive information.
- *Hands-on experiments:* Allow students to conduct simple, safe experiments to understand concepts through observation and participation.
- *Hypothesis and testing:* Teach students to form hypotheses and test them, fostering critical thinking and problem-solving skills.

Cross-Disciplinary Integration

- *Link science with other subjects:* Connect science lessons to mathematics, literacy, and social studies. For example, using math to measure in experiments or writing reports on scientific findings.
- *STEM focus:* Incorporate engineering and technology with science to build problem-solving and design-thinking skills.

Use of Real-World Contexts

- *Relate to everyday life:* Teach science in ways that relate to students' daily experiences, such as discussing weather, plants, animals, or technology they encounter.
- *Field trips and outdoor learning:* Use nature walks, visits to science museums, or local industry visits to reinforce classroom learning in real-world contexts.

9: Classroom Support

Teaching Assistants and helpers are used in Science to assist:

- In the classroom throughout the school by working with groups and individuals on task.
- Preparing equipment and lesson items
- In providing targeted and positive support to those pupils identified with difficulties
- In providing other help, such as preparation of resources and display work
- To visit (re visit) key Knowledge, Skills and Vocabulary with focus children before the lesson/ activity i.e.. Pre-teach and re-visit sessions.

10: Learning Environments:

Classrooms will have displays of current Science learning, including relevant vocabulary, (with explanations when/if necessary), examples of children's learning and scientific information and stimulating questions. All classes have a *'Knowledge Organiser'* displayed on the wall for the science unit they are currently teaching. Please see the Science file on the Share Point for an overview of scientific vocabulary.

11: Rewards

Children's work will be rewards using praise, stickers, DOJOs in line with the school behaviour policy.

Appendix 1 – 'What ASPIRE looks like in Science?

1. **What do you aim to achieve in your curriculum?**

What does ASPIRE Look Like in a Science Classroom?

- *Investigative science* takes centre stage, where students ask questions, experiment, and draw conclusions from their observations.
- Teachers use *real-life examples* to make lessons relevant, from weather patterns to everyday technology, connecting abstract science with the world students see around them.
- Pupils are continuously supported and challenged to take ownership of their learning, revisiting core concepts regularly and applying them in increasingly complex ways.
- The classroom promotes an environment where *everyone is included*, regardless of ability, and students feel safe to express their ideas, take risks, and learn from both successes and failures.

By applying the A.S.P.I.R.E. principles in science education, the goal is to cultivate scientific curiosity, critical thinking, and a passion for lifelong learning, while ensuring every child feels valued, engaged, and prepared for the future.

A – A whole school curriculum with high expectations and excellence delivered rigorously through well sequenced subjects, progression in generative knowledge, rich vocabulary, concepts and skills.

In science, this means delivering a well-planned curriculum that:

- Ensures high standards for *all pupils*, challenging them to excel in scientific knowledge and skills.
- Follows a *clear sequence*, progressing from basic concepts (e.g., understanding states of matter) to more complex ideas (e.g., energy transformations) as pupils move through year groups.
- Focuses on building a solid foundation of *core knowledge*—from scientific vocabulary (e.g., hypothesis, ecosystem) to key scientific theories.
- Provides *opportunities for scientific enquiry*, giving students the tools to observe, predict, experiment, and analyse data rigorously.

S –Stimulating enquiring minds by providing rich and relevant experiences, purposeful and connected learning, and creative thinking.

In science, stimulating enquiring minds means:

- Encouraging students to ask *why* and *how* questions, leading them to develop *critical thinking* and problem-solving skills.
- Providing *hands-on experiments* and investigations that relate to real-world phenomena, such as how plants grow, how forces act, or why the weather changes.
- Promoting *cross-curricular links*, where science connects with mathematics, technology, and geography, making learning more purposeful and engaging.
- Using *creative thinking* in projects, encouraging students to design solutions, investigate challenges, or even work like young scientists in STEM-focused activities.

P – Placing nurturing, lifelong learning behaviours – resilience, risk taking, independence, perseverance, and pride in success - at the heart of our curriculum.

In science, fostering lifelong learning behaviours means:

- Developing *resilience* as students encounter challenges in experiments or investigations that may not go as expected, encouraging them to learn from mistakes.
- Promoting *risk-taking* by allowing students to propose hypotheses, test them, and draw conclusions based on evidence, even if their initial ideas don't work.
- Encouraging *independence* by supporting students in leading parts of their own investigations, while providing guidance when necessary.
- Teaching *perseverance* through long-term science projects, and celebrating *pride in success* when students discover or create something meaningful.

I – Inclusivity and flexibility which allows us to cater for individual needs, abilities and interests

In science, inclusivity and flexibility mean:

- Designing lessons that are *adaptable* to different learning styles and abilities, ensuring that every child has the chance to participate and succeed.
- Offering *differentiated support* for students who may need additional help, while extending learning opportunities for more advanced learners through extra challenges or deeper enquiries.
- *Respecting diverse perspectives*, such as considering indigenous knowledge in ecosystems or exploring contributions from scientists from various cultural backgrounds.
- Providing *flexible resources* (e.g., digital tools, hands-on models) to make abstract concepts accessible to all learners.

R- Revisiting key knowledge, skills and vocab, so pupils know more and remember more.

In science, revisiting key knowledge and skills ensures:

- *Cumulative learning*, where students revisit foundational topics—such as energy, forces, and ecosystems—at increasing levels of depth as they progress through primary school.
- The regular reinforcement of *scientific vocabulary* and skills, so that students not only understand concepts but can also express them accurately.
- Using *frequent assessments* and quizzes to check understanding, and *revisiting experiments* or concepts that students found challenging, so they can build a lasting knowledge base.
- Ensuring that knowledge from different areas of science is *connected and reinforced*, such as linking lessons about the human body to nutrition and health.
- Science knowledge is revisited at the start of every lesson by using their retrieval practice. Key vocabulary is regularly reviewed and discussed.. Quizzes at the end of topics all pupils to show how much they remember.

E -Encompassing the Whole Child – developing their faith, values, spirituality, health and well-being, and understanding of the world we live in, their future role in our culturally diverse community and country where equality and tolerance is promoted

In science, encompassing the whole child means:

- Addressing *spiritual, moral, and ethical questions* in science, such as the environmental impact of human actions or the ethical implications of scientific discoveries.
- Promoting *well-being* through health education, teaching about nutrition, exercise, and the body, and how to make informed choices for personal and environmental health.
- Fostering an appreciation of *global scientific challenges*, such as climate change, sustainability, or biodiversity, and helping students understand their role in the global community.
- Teaching *cultural and scientific diversity*, showing how different cultures have contributed to scientific knowledge, and promoting values of *equality and tolerance*.

2. <u>What is the reason for your curriculum design?</u>

The order of teaching has been based upon the aim to build substantive and disciplinary knowledge within the year and across year groups, and also to take advantage of the best time of year to observe the natural environment.

3. <u>How did you achieve class teachers/ TA sharing this understanding before they teach your subject?</u>

We value support from colleagues within our local school consortium and LEA(as well as independent research) to provide us with starting points for our curriculum journey. Staff meetings were assigned to the development of this subject, so that all stakeholders had the opportunity to understand the development and reasoning behind the curriculum design. This has developed into documents, accessible to all to demonstrate what the subject should look like in books. We aim to use this as a *'go to'* document to improve consistency and expectations in books.

As the subject leader, part of my role is to ensure that staff have a topic overview and a clear guidance as to which elements of the Knowledge Organiser are to be learned within each lesson, and a knowledge Organiser as their starting point.

From this, they can create their own plans, focusing on the specific lesson objective stated on the MTP. In the development of the new curriculum, all subjects are now expected to start their new topic with a double page spread of the topic cover sheet and knowledge organiser. As this is repeating across subjects, the expectation is now embedded in our practice.

Alongside staff meetings; valuable, informal conversations regularly take place to check on understanding and clarify any questions that staff may have. Rigorous monitoring ensures that staff have the correct expectation and understanding of the subject.

4. Explain what knowledge, progression and sequencing means in your subject?

In the **A.S.P.I.R.E.** Science curriculum, the concepts of **knowledge**, **progression**, and **sequencing** are essential components that ensure a structured, coherent, and effective approach to teaching science. These elements help deliver a high-quality science education that builds on students' understanding over time, deepening their knowledge and skills. Here's what each term means in this context:

Knowledge in the A.S.P.I.R.E. Science Curriculum

- **What it means**: In the A.S.P.I.R.E. framework, *knowledge* refers to the essential facts, concepts, and vocabulary that students need to understand science. This includes foundational scientific principles (such as gravity, ecosystems, or the states of matter), scientific terminology (like hypothesis, photosynthesis, or friction), and key facts about the natural world (such as the water cycle or the solar system).
- **How it works**:
    - Pupils are taught scientific content systematically, building a strong knowledge base that they can draw upon for more complex scientific learning in later stages.
    - *Core knowledge* is emphasised, ensuring students develop a deep understanding of scientific concepts and can recall and apply this information when needed.
    - *Generative knowledge* is also a key focus, which refers to the type of knowledge that forms the foundation for understanding new material. For example, learning about energy in simple forms in early years prepares students to understand more complex energy systems later on.

Progression in the A.S.P.I.R.E. Science Curriculum

- **What it means**: *Progression* refers to the way scientific knowledge and skills are built and developed over time, becoming more sophisticated as students move through different year groups and key stages. It ensures that learning is cumulative and that students continuously deepen their understanding as they advance.
- **How it works**:
    - The curriculum is structured so that students first learn **basic concepts** and **simple knowledge**, and then revisit these ideas in more **complex forms** later on, ensuring a deepening of understanding. For example, a child may learn about forces in early years by pushing and pulling objects, but later on, they will explore forces like gravity, friction, and magnetism in more detail.
    - Progression also applies to *scientific enquiry skills*, with students starting by observing and describing in early years and moving toward more structured investigations, data analysis, and hypothesis testing in later years.
    - It aligns with the National Curriculum's objectives, ensuring that the development of knowledge and skills is appropriate for each key stage and lays the foundation for more advanced learning.

Sequencing in the A.S.P.I.R.E. Science Curriculum

- **What it Means**: *Sequencing* is the careful ordering of scientific topics and skills in a way that builds understanding logically and effectively. It ensures that new learning builds on previous knowledge and that concepts are introduced at the right time, in the right way.
- **How it works**:

- The curriculum is *well-sequenced*, meaning that each lesson or unit connects to prior learning and prepares students for what comes next. This systematic approach ensures that students have the **necessary foundational knowledge** before moving on to more complex ideas.
- For example, students might first learn about simple life cycles (e.g., plant growth) before moving on to the more detailed study of ecosystems and food chains. This logical progression helps solidify students' understanding at each stage.
- Sequencing also takes into account *repetition and reinforcement*. Key concepts are revisited in different contexts to strengthen retention and ensure that students develop a **long-term understanding** of scientific principles.
- It ensures that **vocabulary** and *skills* are introduced at the right time and revisited frequently, so students have multiple opportunities to understand and apply these concepts.

Together, these elements ensure that the science curriculum is **coherent** and **well-structured**, allowing students to build a strong, cumulative understanding of scientific concepts and skills. By carefully sequencing knowledge and providing a clear progression, the A.S.P.I.R.E. curriculum ensures that pupils are well-prepared for future scientific learning, both in school and beyond.

5. How do you promote Reading, Writing and Maths in your subject?

Promoting Reading in the Science Curriculum

- **Scientific Vocabulary Development**:
  Science lessons explicitly teach *subject-specific vocabulary*, such as terms like *"evaporation," "photosynthesis,"* or "friction." By frequently revisiting and using these terms in context, students become familiar with scientific language, improving their reading comprehension and understanding of complex texts.
- **Reading Scientific Texts**:
  Students are encouraged to read a variety of *scientific materials*, including textbooks, articles, experiment instructions, and even science-themed stories. These readings help develop skills in *informational text comprehension*, as students learn to extract key details, make inferences, and understand scientific concepts through written sources.
- **Cross-Curricular Literacy Links**:
  Science is linked with *English lessons* through science-related reading activities, such as exploring biographies of famous scientists (e.g., Charles Darwin, Marie Curie) or reading fiction/non-fiction books that introduce scientific ideas. This helps students develop reading fluency and comprehension in the context of science.
- **Independent Research and Reading**:
  Pupils are encouraged to conduct independent research on science topics, which involves reading and summarizing information from various sources. This promotes active engagement with texts, improving both *reading skills* and *critical thinking*.

Promoting Writing in the Science Curriculum

- **Recording Observations and Results**:
  During practical investigations, students are required to *record observations*, *write down predictions*, and *document their results*. This not only strengthens their ability to communicate scientifically but also improves their overall writing skills, particularly in using clear, concise language.
- **Writing Science Reports**:
  Students are taught how to write *formal science reports* that include sections such as

introduction, hypothesis, method, results, and conclusion. This format helps them develop structured writing skills and the ability to communicate findings clearly and logically.

- **Explanatory Writing**:
  Science encourages pupils to explain processes and phenomena in writing, such as describing how plants grow or how forces work. This kind of *explanatory writing* helps students build their ability to convey complex ideas clearly, which is a vital skill both in and out of science.
- **Argumentative and Persuasive Writing**:
  In higher-level science topics, students may be asked to *debate ethical issues* (e.g., the use of plastic, climate change, or medical advancements) and write persuasive essays. This promotes critical thinking and the ability to argue a point of view using scientific evidence, reinforcing both their writing skills and understanding of the subject.

Promoting Maths in the Science Curriculum

- **Measuring and Data Handling**:
  Science often involves *measuring quantities* (e.g., weight, length, temperature, time) during experiments, which helps reinforce key mathematical skills such as *reading scales*, *estimating*, and *using standard units of measurement*. Practical investigations also develop students' ability to work with numbers in a meaningful, real-world context.
- **Graphing and Data Interpretation**:
  Pupils are taught to collect and organise data from experiments, then represent it visually using *bar charts*, *line graphs*, and *tables*. These tasks require them to apply mathematical concepts such as *interpreting scales*, *plotting points*, and *calculating averages* or *totals*. By analysing these graphs, students improve both their mathematical reasoning and their ability to draw scientific conclusions from data.
- **Mathematical Calculations in Science**:
  Many scientific principles involve calculations, such as working out *speed* (distance/time), *force* (mass × acceleration), or *energy*. These applications strengthen students' ability to perform calculations, reinforcing concepts taught in mathematics lessons. In primary science, pupils might calculate simple averages, percentages, or ratios as part of their investigations.
- **Problem-Solving Skills**:
  Scientific enquiries often involve solving problems that require the use of *mathematical reasoning*, such as designing fair tests or calculating the amount of resources needed for an experiment. This promotes logical thinking and the ability to apply maths in practical situations, enhancing numeracy skills.

Appendix – How the Science ASPIRE curriculum meets the needs of the National Curriculum.

The **A.S.P.I.R.E.** curriculum in science aligns closely with the objectives and requirements of the **National Curriculum in England** by addressing the core elements of science education while also promoting broader developmental goals. Below is how the A.S.P.I.R.E. framework meets the needs of the National Curriculum in England:

1. Scientific Knowledge and Conceptual Understanding

A – Ambitious, Rigorous, and Well-Structured Curriculum

- The National Curriculum emphasises acquiring key scientific *knowledge* and *conceptual understanding* in biology, chemistry, and physics. The A.S.P.I.R.E. curriculum ensures a *well-sequenced progression* of subjects, helping students build knowledge in a systematic way, which is a core requirement.
- It also highlights the need for a rich and *developing vocabulary*, which is key to understanding and expressing scientific ideas clearly, in line with the National Curriculum's emphasis on using *appropriate terminology*.

2. The Nature, Processes, and Methods of Science

S – Stimulating Enquiring Minds

- The National Curriculum emphasises teaching the *methods and processes* of scientific enquiry so that pupils can develop an understanding of *how science works*. The A.S.P.I.R.E. framework directly supports this by encouraging enquiry-based learning, experimentation, and creative thinking.
- Pupils are actively engaged in *asking questions, planning experiments, testing hypotheses*, and developing their critical thinking, meeting the National Curriculum's aim to foster scientific reasoning and the application of scientific principles.

3. Progression and Building on Knowledge

R – Revisiting Key Knowledge and Skills

- The National Curriculum requires that learning is *progressive*, revisiting and deepening scientific understanding as students advance. The A.S.P.I.R.E. framework ensures that key concepts, skills, and vocabulary are revisited frequently, so students can retain and build on their understanding, which is essential for deep learning.
- This approach supports the curriculum's focus on *cumulative knowledge* and helps children to *know more and remember more*, ensuring they meet expectations by the end of Key Stages.

4. Working Scientifically

P – Prioritising Lifelong Learning Behaviours

- The National Curriculum defines *"working scientifically"* as a set of skills students need to develop: observing, classifying, testing, predicting, and evaluating. A.S.P.I.R.E. promotes

these behaviours through *resilience, risk-taking, and independence*, encouraging students to engage fully in scientific enquiry and investigation.

- This framework supports the aim of helping students *develop perseverance* and pride in success, reinforcing their confidence to explore scientific challenges and solve problems.

5. Practical Scientific Enquiry and Investigations

I – Inclusivity and Flexibility

- Practical scientific enquiry is central to the National Curriculum, which encourages students to develop *skills of enquiry* through hands-on experiments and investigations. A.S.P.I.R.E.'s inclusive and flexible approach allows students to engage in practical work that caters to *individual abilities and learning styles*, ensuring that all pupils, regardless of background or ability, can participate.
- This meets the National Curriculum's goal of ensuring all students *engage in practical work*, thus promoting scientific skills for every child.

6. Use of Scientific Language, Mathematical Skills, and Cross-Curricular Learning

E – Encompassing the Whole Child

- The National Curriculum places importance on using *accurate scientific language* and developing *mathematical skills* relevant to scientific enquiry, such as measuring and data handling. A.S.P.I.R.E. integrates these through revisiting scientific vocabulary and encouraging connected learning between science, mathematics, and other subjects.
- By fostering values such as *well-being* and understanding *global issues* like sustainability and diversity, A.S.P.I.R.E. ensures science education promotes not only academic development but also *spiritual, moral, and cultural growth*, aligning with the curriculum's broader aims for students' holistic development.

7. Preparation for Life in Modern Britain

E – Encompassing the Whole Child

- The National Curriculum stresses preparing pupils for life in a diverse and culturally rich society. A.S.P.I.R.E. develops pupils' understanding of *equality, tolerance, and respect*, fostering the knowledge, attitudes, and skills that support *British values*.
- By promoting *understanding of the world*, environmental awareness, and ethical considerations in science, this framework ensures that students are prepared to contribute positively to society, meeting the curriculum's focus on personal development and citizenship.

How ASPIRE Specifically Meets Key Stage Requirements

- **Key Stage 1**: The National Curriculum for Key Stage 1 requires students to observe the world around them, use simple equipment, and understand basic concepts such as plants, animals,

and seasonal changes. The A.S.P.I.R.E. curriculum's emphasis on stimulating enquiring minds and providing relevant, connected learning ensures that students in Key Stage 1 build foundational knowledge through engaging, hands-on experiences.

- **Key Stage 2**: In Key Stage 2, the National Curriculum emphasizes scientific enquiry, including making predictions, conducting fair tests, and using evidence to draw conclusions. The A.S.P.I.R.E. curriculum supports this by fostering resilience, independence, and pride in scientific investigation, encouraging deeper understanding and revisiting key concepts to ensure retention and progression.

Conclusion

The A.S.P.I.R.E. framework not only meets the statutory requirements of the National Curriculum in England, but it enhances science education by focusing on holistic development, inclusivity, and life skills. Its structure allows students to develop both scientifically and personally, ensuring they acquire the knowledge, skills, and values needed to succeed academically and as informed, responsible citizens

Appendix – 'EYFS in Science'

In the Early Years Foundation Stage (EYFS), the primary focus is on building a strong foundation for children's learning through play-based activities and exploration. While science is not a distinct subject in the EYFS framework, it is integrated into several key areas of learning, particularly Understanding the World. The A.S.P.I.R.E. science curriculum effectively supports and aligns with the EYFS objectives by fostering curiosity, exploration, and foundational scientific thinking through a broad, child-centered approach.

Key Areas of EYFS Objectives Supported by the Science Curriculum:

1. Understanding the World

This area is where scientific thinking is most directly nurtured in EYFS. It encourages children to make sense of their environment, people, and the natural world.

How A.S.P.I.R.E. covers this objective:

- Exploration and Observation: Children engage in hands-on activities that allow them to explore their surroundings. This includes observing plants and animals, investigating natural materials like water and sand, and exploring seasonal changes. These activities introduce basic scientific concepts such as growth, life cycles, and the properties of materials.
- Practical Enquiry and Curiosity: By encouraging young learners to ask questions about the world (e.g., "Why do leaves change colour?" or "What happens when we mix water and sand?"), the A.S.P.I.R.E. framework promotes scientific enquiry in a way that is age-appropriate and linked to everyday experiences.
- Early Scientific Language: While working in these exploratory activities, children are introduced to simple scientific vocabulary, such as "grow," "change," "weather," and "plant." This aligns with the EYFS goal of developing language related to the natural world, preparing them for more structured science learning later on.

2. Communication and Language

EYFS emphasizes developing children's communication skills, which are essential for scientific thinking and learning.

How A.S.P.I.R.E. covers this objective:

- Describing and Explaining: Through science activities, children are encouraged to talk about what they see, describe changes, and share their ideas with others. For example, during a nature walk, children may describe the textures of different leaves or explain what happens when ice melts. This promotes scientific language and verbal expression.
- Listening and Following Instructions: Practical science activities, such as simple experiments or nature observations, require children to listen to instructions and follow simple steps, which develops both their language and their scientific enquiry skills.

3. Physical Development

EYFS also focuses on physical development, which can be supported through hands-on, exploratory science activities.

How A.S.P.I.R.E. covers this objective:

- Fine and Gross Motor Skills: Activities such as planting seeds, mixing materials, or building structures encourage children to use their hands and develop fine motor skills. Gross motor skills are developed through outdoor activities that involve exploring the environment, such as digging or observing wildlife.
- Understanding Health and the Body: Science lessons in EYFS introduce basic ideas about the human body, such as the importance of exercise, healthy eating, and personal hygiene. This knowledge supports children's understanding of their own physical development and well-being, which is a key EYFS objective.

4. Personal, Social, and Emotional Development

Building confidence, independence, and collaborative skills is a core part of EYFS, and science plays a key role in developing these abilities.

How A.S.P.I.R.E. covers this objective:

- Working Together: Many science-based activities in EYFS, such as group explorations or simple experiments, encourage teamwork. Children are supported in collaborating with peers, sharing resources, and discussing their observations together, building their social and communication skills.
- Building Curiosity and Independence: Through independent enquiry and exploration, the A.S.P.I.R.E. curriculum nurtures children's curiosity and independence. For example, providing opportunities to explore nature independently or encouraging children to ask questions and make predictions fosters self-directed learning and confidence.

5. Literacy and Mathematics

Science in EYFS also contributes to the development of early literacy and numeracy skills.

How A.S.P.I.R.E. covers this objective:

- Early Literacy Skills: Children in EYFS are encouraged to talk about their observations, draw pictures, or engage in role-play that involves science concepts (such as pretending to be an astronaut or a gardener). They may also listen to stories that include scientific ideas, such as books about animals, weather, or space.
- Early Numeracy Skills: Science activities often involve counting, sorting, comparing sizes, and using simple measurements. For instance, children may count how many seeds they planted or compare the height of plants over time. This helps develop both their understanding of the natural world and their mathematical thinking.

6. Expressive Arts and Design

The EYFS encourages creativity and expression, which can be supported through the science curriculum.

How A.S.P.I.R.E. covers this objective:

- Creative Exploration: Children engage in creative activities that explore science-related concepts. For example, they might create collages of different materials, draw pictures of animals, or make weather-related crafts (such as creating a rain cloud using cotton wool). These activities link science with artistic expression.
- Science through Play: The A.S.P.I.R.E. framework encourages role play and imaginative activities that help children explore science concepts. For instance, playing in a "science lab" or pretending to care for animals helps children engage with scientific ideas in a creative and fun way.

<u>Specific Science Activities that Cover EYFS Objectives:</u>

- Nature Walks: Exploring the local environment, identifying plants, animals, and seasonal changes, and discussing weather.
- Simple Experiments: Exploring floating and sinking, mixing water and sand, or observing melting ice, which introduces basic scientific concepts in a playful and engaging way.
- Growing Plants: Planting seeds, watering plants, and observing how they grow. This helps children understand growth and change in living things.
- Exploring Materials: Sorting objects by texture, colour, or material (such as wood, metal, plastic), helping children develop a basic understanding of materials and their properties.
- Weather Exploration: Observing and discussing different weather conditions, learning simple vocabulary like "sunny," "rainy," or "cloudy."

Appendix – Long term plan

Science

Long Term Plan

	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 1
EYFS	Animals Including Humans	Seasonal Changes (Autumn)	Animals Including Humans Seasonal Changes (Winter)	Animals Including Humans / Plants Seasonal Changes (Spring)	Everyday Materials Seasonal Changes (Summer)	Scientists & Inventors
YEAR 1	Everyday Materials	Seasonal Changes (Autumn & Winter)	Animals Including Humans	Seasonal Change (Spring and Summer)	Plants	Scientists & Inventors
YEAR 2	Uses of Everyday Materials	Living Things and Their Habitats	Animals Including Humans	Plants	Biodiversity	Scientists & Inventors
YEAR 3	Light and Shadows	Animals Including Humans	Forces and Magnets	Plants	Rocks	Scientists & Inventors
YEAR 4	Animals Including Humans	Living Things and Their Habitats	Electricity	States of Matter	Sound	Scientists & Inventors
YEAR 5	Properties and Changes of Materials	Forces	Earth and Space	Animals Including Humans	Living Things and Their Habitats	Scientists & Inventors
YEAR 6	Evolution and Inheritance	Animals Including Humans	Light	Electricity	Living Things and Their Habitats	Scientists & Inventors