# AYCLIFFE DRIVE PRIMARY SCHOOL

# SCIENCE POLICY

## Curriculum Committee

**Updated June 2017**
**To be reviewed 2020**

**Staff Responsible**

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| **Mrs M Green** | **Head Teacher** |
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# Science Policy

## How Science is taught:

Science is a way of thinking which leads to our understanding of the world around us. Through Mathematics, English, Forest School and Outdoor Learning, we give the children the basic skills needed to develop an understanding of their environment. Through Science we give them the essential questioning and investigative skills. The question, "why?" and "how?" must play a key role in the children's Science teaching and learning. Practical activities are the best medium for understanding Science and the children are encouraged to investigate scientifically for themselves as well as follow a more structured approach.

Science teaching will offer opportunities for children to:

- develop knowledge and understanding of important scientific ideas, processes and skills and relate these to everyday experiences;
- learn about ways to explore, question, predict, investigate, record, conclude and to communicate their findings using scientific vocabulary;
- value the work of scientists and the contributions they have made to our world.;
- understand how different types of science impacts on the world we live in;
- understand how science impacts on human development and its life cycle. (Only YR6 will be taught the relevant elements of sex education which is implemented by external organisations eg school nurse).

These aims and purposes are expanded below.

## Knowledge and understanding

Children should:

- be curious about things they observe, and experience and explore the world about them with all their senses;
- use this experience to develop their understanding of scientific ideas and findings to make links between different phenomena and experiences;
- think about a variety of ways to represent things they cannot directly experience (diagrams, illustrations and models);
- try to make sense of phenomena, seeking explanations and thinking critically about claims and ideas.

## Processes and Skills

Children should:

- acquire and refine the practical skills needed to investigate questions safely;
- develop skills of predicting, asking questions, making inferences, planning and implementing, concluding and evaluating based on evidence and understanding and to use these skills in investigative work;
- practise mathematical skills *eg. counting, ordering numbers, measuring to an appropriate number of decimal places, drawing and interpreting graphs and bar charts* in real contexts;
- learn why numerical and mathematical skills are useful and helpful to understanding.

**Language and Communication**

Children should:

- think creatively about science and enjoy trying to make sense of phenomena;
- develop language skills through talking about their work and presenting their own ideas using sustained and systematic writing of different kinds;
- use scientific and mathematical language including technical vocabulary and conventions, and draw diagrams and charts to communicate scientific ideas;
- read non-fiction and extract information from sources such as reference books, the Internet and video clips (Youtube).

**Values and Attitudes**

Children should:

- work with others, listening to their ideas and treating these with respect;
- develop respect for evidence and evaluate critically ideas which may or may not fit evidence available;
- develop a respect for the environment, all living things and for their own health and safety (Forest School).

**Safety**

- The school follows the advice published in 'Be Safe' document by the ASE as recommended by the LEA. Teachers need to make risk assessment for situations not covered in 'Be Safe'.
- All teachers will be expected to refer to this publication when planning activities and assessing for any risk to pupils.
- Further free Health and Safety advice can be sought from CLEAPSS
- Pupils will be made aware of safety issues that arise in topics or activities and will be trained to use the appropriate equipment and carry out tasks in a safe and responsible manner.
- Pupils will be increasingly required to identify safety considerations in their planning as they progress through the school.

**Classroom Management**

Children are taught in mixed ability classes and also in mixed age classes. The Curriculum is planned to avoid repetition between years. All pupils need to be challenged within their stage of development. They are taught as a class, in groups and individually. Science learning should be equally accessible and appealing to both boys and girls.

The Science resources are contained in three areas:

- a core of everyday equipment in each classroom
- in central resource cupboards and library
- in the grounds outside, including: the conservation and woodland area at the back of the field.

**Presentation**

- The way that the work is to be presented will be clearly identified in the lesson objectives and will relate to the ability of groups of pupils.

- Pupils will experience and be taught a variety of styles of presenting or recording their work. These will include:
    I. verbal reports and discussions;
    II. drawings, diagrams, charts, graphs;
    III. demonstration of experiments
    IV. artistic and dramatic presentations;
    V. written work in a variety of styles and for different audiences;
    VI. using a range of technologies.
- Pupils will be encouraged, when appropriate, to make their own choice of appropriate style of presentation.
- Work will be presented:-
    I. in individual exercise books or folders;
    II. in whole class topic books;
    III. as wall or classroom displays;
    IV. by annotating activities or models;
    V. as audio-visual displays;
    VI. through assemblies;
- Teachers will set high expectations for the quality and accuracy of the work presented and encourage children to evaluate their success.

**Assessment and Evaluation**

Assessment can be made on the children's knowledge of Science, their understanding and their investigative abilities; the latter both individually and part of a group. This can take place on a formal or informal basis depending on the age group of the pupils. Children will also be assessed formally after each science unit and staff will have built up a bank of appropriate evidence, to assess each of the science programmes of study.

Children will be given, at times, the opportunity to self- assess their learning after each unit of work covered; using relevant unit targets. In KS2, children are also encouraged to comment on what they have enjoyed learning within each unit.

Science homework may also be set in KS1 and 2 although not necessarily on a regular basis.

Future assessment of children's attainment will track the progress for both knowledge and working scientifically for each topic.

**Features of Progression**

To ensure children make progress in science, teaching should provide opportunities for children, as they move through Key Stages 1 and 2, to progress:

- from using everyday language to increasingly precise use of technical and scientific vocabulary, notation and symbols;
- from personal scientific knowledge in a few areas to understanding a wider range of areas and of links between areas;
- from describing events and phenomena to explaining, possibly demonstrating, events and phenomena;
- from explaining phenomena in terms of their own ideas to explaining phenomena in terms of accepted ideas and theories of scientists;
- from participating in given practical science activities to increasingly developing their own experimental situations;
- from unstructured exploration to more systematic and planned investigation of a question;

- from using simple drawings, diagrams and charts to represent and communicate scientific information to using more conventional diagrams and graphs.

**Inclusion and meeting the needs of all pupils**

These children are integrated into the classroom and have the same access to the Curriculum as other children - physical disabilities may hamper some of their practical Science work and various strategies may have to be employed. Work planned by the class teacher should be both challenging and appropriate to the ability level of pupils with special educational needs.

Whenever possible, pupils with special educational needs are included in work planned for the whole class in the Science lesson, with the teacher appropriately differentiating the work to extend them. However, pupils with severe learning difficulties may be withdrawn from part of the lesson for specific consolidation of skills, planned by the teacher and appropriate to their ability level.

TAs provides practical support for the class teachers' planned work for SEND pupils. Teachers' planning, where appropriate, will details the work the TAs will undertake with their SEND pupils, so they are aware of the teachers' aims.

Provision will be made when necessary for higher thinking pupils to extend their experiences beyond that of the majority of the class by one of the following:

- reducing the level of support provided and thereby increasing the need for independent thinking and decision making
- increasing the level of knowledge to be gained and communicated
- applying knowledge to an unfamiliar context
- setting more challenging criteria for investigating and presenting information

**Planning**

Long and medium term planning are based on a two year cycle for both KS1 and KS2. The planning is in-line with the new programmes of study and attainment targets for science at key stages 1 and 2 as presented in the National Curriculum that was published in 2014. Support and guidance for planning is also provided by "Activelearn – Sciencebug" which is our on-line purchased scheme of work

**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, but 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.

**Lower key stage 2 – years 3 and 4**

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 comparative and 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, 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 and spell scientific vocabulary correctly and with confidence, using their growing word-reading and spelling knowledge.

**Upper key stage 2 – years 5 and 6**

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 comparative and 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.

In the Foundation stage, Science is taught through Knowledge and Understanding of the World. In this area of learning, children are developing knowledge, skills and understanding that will help them make sense of the world around them through first hand experience. The

children will be able to talk about their observations, sometimes recording them and encouraged to ask questions to gain information about why things happen and how things work. This forms the foundation for future learning in Science.

**Science Week or STEM Week**

This takes place on a 2 year cycle and involves the whole school. Every year group will have a workshop based activity, where possible, linked their chosen theme for the week. A Science theatre production team is booked to perform to all key stages during the week. Competitions involving all pupils and family entries will be held. Staff may also include visits from individuals from the world of science to talk to the children.

**Next Review**

This policy will be reviewed every 2 years.

| Skill | | Key Stage 1 ('Phase A') | Lower Key Stage 2 ('Phase' B) | Upper Key Stage 2 ('Phase C') |
|---|---|---|---|---|
| Ideas and questions | | • **asks simple questions and recognising that they can be answered in different ways**<br>• recognises scientific and technical developments that help us | • **asks relevant questions and using different types of scientific enquiries to answer them**<br>• explains the purposes of a variety of scientific and technological developments | • uses their scientific experiences to explore ideas and raise different types of questions<br>• talks about how scientific ideas have developed over time<br>• recognises the applications of specific scientific ideas |
| Planning | Planning an approach | • **performs simple tests** or follows teachers' instructions<br>• experiences different types of science enquiry<br>• with guidance, suggests what they will do<br>• with guidance, identifies things to measure or observe that are relevant to the question | • **sets up simple practical enquiries, comparative and fair tests**<br>• begins to make their own decisions about the most appropriate type of scientific enquiry to answer questions begins to make decisions about what observations to make and how long to make them for | • selects and **plans different types of scientific enquiries to answer questions**<br>• makes decisions about what observations to make, what measurements to use, how long to make them for and whether to repeat them |
| | Equipment | • uses resources provided or chosen from a limited range<br>• uses simple measurements and equipment to gather data | • begins to choose the type of simple equipment that might be used from a reasonable range<br>• uses appropriate equipment and measurements with reasonable accuracy | • chooses the most appropriate equipment to make measurements<br>• explains how to use the equipment accurately |
| | Variables | • suggests why a test is unfair | • recognises when a simple fair test is needed<br>• with help, decides how to set up a fair test and control variables | • recognises when and how to set up comparative and fair tests<br>• **recognises and controls variables where necessary**<br>• e.g. explains which variables need to be controlled and why) |

| Skill | | Key Stage 1 ('Phase A') | Lower Key Stage 2 ('Phase' B) | Upper Key Stage 2 ('Phase C') |
|---|---|---|---|---|
| Obtaining and presenting evidence | Observing and measuring | • observes closely (including changes over time), using simple equipment<br>• makes measurements using non-standard units | • makes systematic and careful observations<br>• makes accurate measurements using standard units, using a range of equipment, e.g. data loggers and thermometers | • takes measurements, in standard units, using a range of scientific equipment, with increasing accuracy and precision<br>• takes repeat readings when appropriate |
| | Secondary sources | • uses simple secondary sources to find answers, e.g. books, videos, photographs or people | • recognises when and how secondary sources might help answer questions that cannot be answered through practical investigations | • recognises which secondary sources will be most useful to research their ideas<br>• begins to separate opinion from fact |
| | Recording information and data | • gathers and records simple data to help in answering questions<br>• with support, prepares simple tables to record data | • gathers and records data in a variety of ways to help in answering questions<br>• prepares own format for recording data<br>• makes decisions about how to record and analyse the data | • records data and results of increasing complexity<br>• decides how to record data from a choice of familiar approaches calculates mean value where appropriate |
| | Presenting evidence | • with help, records their findings in a range of ways, e.g. simple tables, diagrams, pictograms, sorting circles, bar charts and templates<br>• talks about their findings using everyday terms, text scaffolds or simple scientific language | • records and presents findings using drawings, labelled diagrams, keys, tally charts, Carroll diagrams, Venn diagrams, bar charts and tables<br>• reports on findings from enquiries, in simple scientific language, using oral and written explanations, displays or presentations of results and conclusions | • records and presents findings using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs<br>• reports on findings from enquiries, using relevant scientific language and conventions, in oral and written explanations such as displays and other presentations |

| Skill | | Key Stage 1 ('Phase A') | Lower Key Stage 2 ('Phase' B) | Upper Key Stage 2 ('Phase C') |
|---|---|---|---|---|
| Considering and evaluating evidence | Looking for patterns | • uses simple observable features to compare objects, materials and living things<br>• identifies and classifies (decides how to sort and group objects)<br>• with guidance, begins to notice changes, patterns (i.e. cause and effect) and relationships (i.e. how one variable affects another) | • uses observable and other criteria to group, sort and classify in different ways<br>• (including simple keys and branching databases)<br>• identifies differences, similarities or changes related to simple scientific ideas and processes<br>• with help, looks for changes, patterns, and relationships in their data | • uses and develops keys and other information records to identify, classify and describe living things and materials<br>• identifies conclusions, causal relationships and explanations of results<br>• identifies patterns that might be found in the natural environment |
| | Explaining results | • talks about what they have found out and how they found it out<br>• uses their observations and ideas to suggest answers to questions | • with help, uses results to draw simple conclusions and answers questions using appropriate level of knowledge and their own experiences<br>• uses straightforward scientific evidence to answer questions or to support their findings | • draws valid conclusions, explains and interprets the results (including the degree of trust) using scientific knowledge and understanding (e.g. recognises limitations of data) identifies scientific evidence that has been used to support or refute ideas or arguments |
| | Communication | • uses comparative language to describe changes, patterns and relationships | • uses relevant scientific language to discuss their ideas and communicate their findings | • uses relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas |
| | Evaluating | • with support, suggests whether or not what happened was what they expected<br>• with support, suggests different ways they could have done things | • with support, uses results to suggest improvements to what they have done<br>• with support, raise further questions<br>• (e.g. arising from the data)<br>• with support, makes predictions for new values within or beyond the data collected | • makes practical suggestions about how their working method could be improved (e.g. sample size on reliability)<br>• uses results to identify when further tests and observations might be needed<br>• uses test results to make predictions and to set up further comparative and fair tests |

**Vocabulary for working scientifically**

variable, evidence, fair test, method, equipment, results, conclusion, accurate, reliable, prediction supports, observe, measure, question