# Science Policy

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**Rationale**

At Ash Green, we believe that teaching and learning in Science should stimulate and excite children's curiosity about the world around them. It provides first hand experiences and support for children to develop enquiring minds, learning how to question and discuss science through collaboration. Starting from the views already held, children are given the opportunity to have their views challenged, to change their views and ultimately improve their understanding. A planned range of practical experiences set in meaningful contexts helps to develop a range of investigative skills and allows children to take risks and learn from their mistakes, developing them into independent learners.

Pupil and staff voice was used to create our school values for Science:


These values are displayed in every classroom and are used to guide any planning and monitoring done by the Science leader.

**Aims and Objectives**

The teaching of Science is planned to help develop the key scientific skills of:

- Asking questions
- Hypothesising and predicting
- Planning and carrying out a range of investigations
- Using equipment correctly
- Observing and measuring
- Recording data
- Presenting results in a variety of ways, including the use of ICT
- Comparing and evaluating results, looking for patterns
- Drawing conclusions

We believe that through developing key scientific skills pupils should acquire knowledge and understanding of:

- Life processes and living things
- Materials and their properties
- Physical processes

In addition, Science provides the opportunity for children to develop the following cross-curricular skills:

- Communication in a variety of contexts through promoting the skills of reading, writing, speaking and listening. (research skills)
- Application of number through the use of weights and measures, handling data, estimating and predicting
- Use of ICT to measure, record, present and interpret data where appropriate
- Working cooperatively with others
- Problem solving
- Independent individual thinking as they follow a line of enquiry

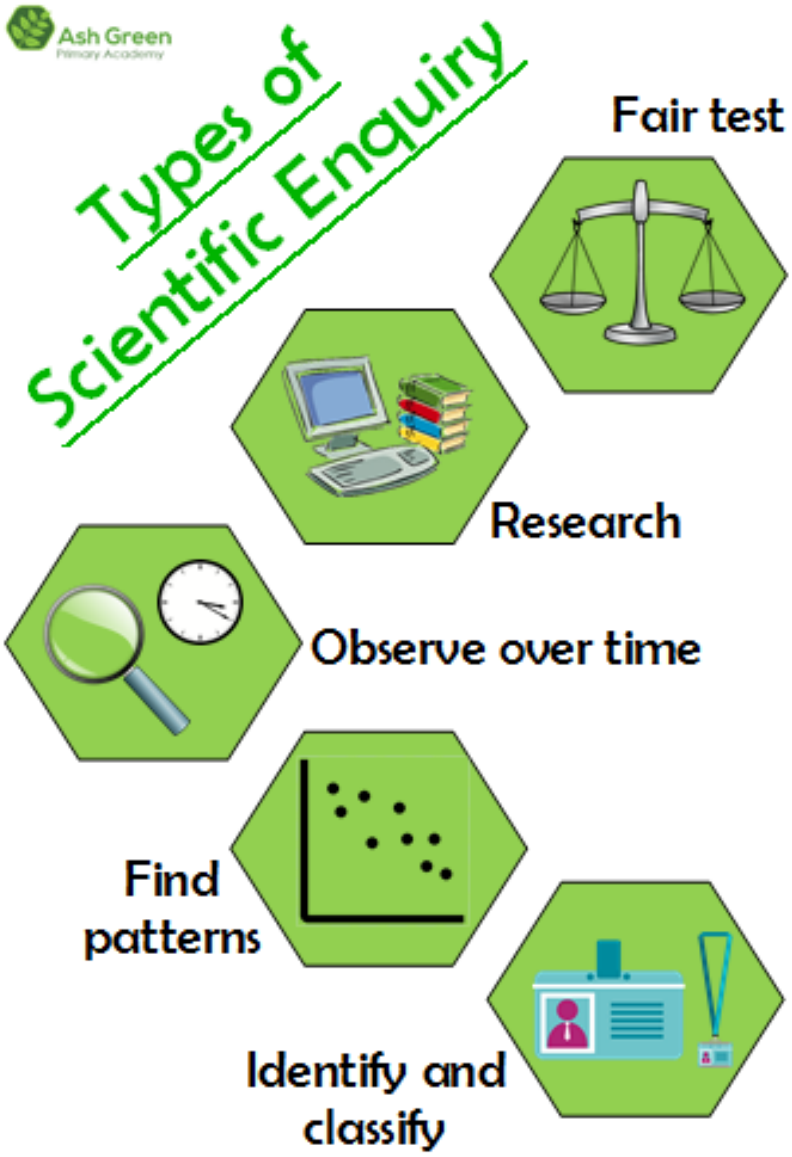
**Curriculum planning**

Science is taught weekly and should be practical as much as possible. Science work is recorded in a variety of ways, with evidence gathered in Big Books (one per class at KS1, one per group at KS2).

Teachers use the school planning format for each science unit (see Appendix A), which includes the use of a concept map (to track pupils' developing understanding of key vocabulary – see Appendix B), Bright Ideas Time slots (see Appendix C), the different types of enquiry and the application of cross-curricular skills (writing, maths and computing).

**Enquiry types**

Pupils helped to create logos for the different types of enquiry:




**T**hese logos are displayed in every classroom, used in teachers' planning and in lessons to ensure that pupils are regularly experiencing all types of enquiry and are able to explain what type of enquiries they are participating in.

**Resources**

Science resources are currently stored in labelled containers in the KS2 Science cupboard (off the Year 5 cloakroom), the Y5 break-out room and the D&T cupboard (next to Year 4 cloakroom). There are also various Science books and textbooks on the bookcase between the Year 5 and 6 classrooms.

Resource audits will be carried out annually. If staff are aware of any resource needs or damages, they should inform the Science leader. The cost of everyday objects required for experiments can be claimed back, staff should see the school business manager before purchasing.

**Health and Safety**

All lesson plans contain a 'Health & Safety Considerations' section. The class teacher will carry out risk assessments where it is deemed appropriate. The Risk Assessment is completed using the school's proforma. Resources available to support this include: the "Be Safe" booklet (there is a copy in each staff room). If unsure, staff should speak to the Science leader, the head teacher or contact CLEAPPS.

**Role of the Subject leader**

- Maintain high standards of subject knowledge by attending available courses, conferences and subject leaders' update meetings.
- To be aware of national and local developments through reading relevant materials and attending courses as appropriate.
- Keep the written policy document up to date and evaluate the content and method.
- Purchase and organise all Science resources, ensuring they are readily available and well maintained.
- Liaise with other subject leaders to ensure coherence across subject areas.
- Liase with staff at Trentham Academy
- Monitor planning as part of on-going subject monitoring and evaluation of practice.
- Develop and then monitor the use of an assessment system for Science.
- Encourage and support staff in the implementation of the agreed procedures and monitor the progression of activities and consistency of approach across both year groups and Key Stages through lesson observation.
- Monitor the progress made by children, both individuals and cohorts, through book trawls and data analysis, monitoring the tracking of children by teachers and through talking to groups of children to seek their views.
- Submit regular feedback on standards and monitoring in Science to the staff and Senior Leadership Team.
- Arrange training as appropriate to meet the needs of individuals and the school.
- Inform the Governing Body of progress in this area through subject reports.

**Monitoring**

The subject leader will regularly monitor Science learning. This may include: looking at plans and children's work; conducting pupil voice interviews; monitoring and moderating the use of the Science assessment grids.

**Assessment**

Each teacher has an assessment grid for the whole class for that academic year. The grids list the objectives that should be met by the children in each term and by the end of the academic year. Once a child has attained an objective, the teacher ticks it off by the child's name.

To aid the assessment of, and the planning for, the 'Working Scientifically' objectives, the first part of each assessment grid contains age-related skills from the school's skills progression grid (see Appendix D).

Teachers will make a termly judgement of pupils' attainment (Below/Vulnerable/On track/Above), which will be entered onto DcPro.

At the end of an academic year, the teacher will give a copy of the assessment grid to the class' new teacher and a copy to the Science leader.

**Links to P.S.H.E and British Values**

We encourage all children to take an active part in the life of their school and its neighbourhood. Science can provide opportunities for children to gain the knowledge, skills and understanding they need to lead confident, healthy and independent lives and to become informed, active and responsible citizens.

Through science, children learn:

- that people and other living things have needs and that they have a responsibility to meet them.
- what might improve or harm their local, natural and built up environments and some of the ways people look after these resources.
- how to make simple choices that improve their health, including healthy diet and exercise and sexual development.
- that medicines are helpful but can also be harmful if not used properly.
- to identify and respect differences and similarities between people.

# <u>Appendix A:</u> Example of the Science planning format

## Ash Green Science Unit Plan – Human Body – Year 6 - Summer 2019

**Objectives to be met:**

- I can identify and name the main parts of the human circulatory system.
- I can describe the function of the heart, blood vessels and blood.
- I can discuss the impact of diet, exercise, drugs and lifestyle on health.
- I can describe the ways in which nutrients and water are transported in animals, including humans.

**Enquiry types:**

 Fair test

 Pattern seeking

 Identify & classify

 Observe over time

 Research

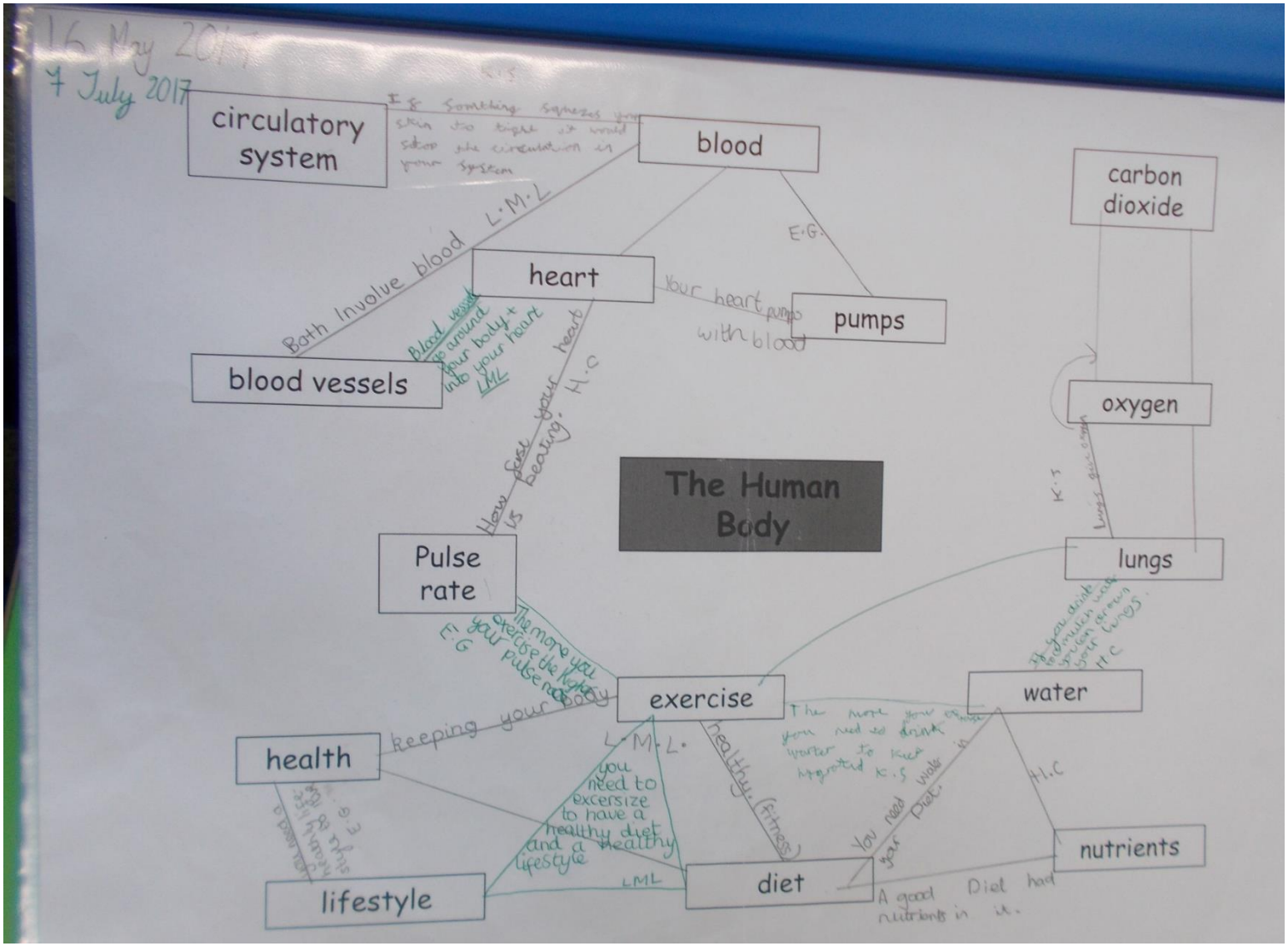
| Session | Bright Ideas Time | Enquiry type | What will the children be doing? | Health & Safety considerations |
|---|---|---|---|---|
| 1 | Concept map | | | |
| 2 | PMI – a body without a skeleton |  | **LO: I can create an interactive model of the human body.**<br>In groups, make a model of the human body using different materials (using books for research about the different body parts) | Remind chn to use scissors carefully and not walk around with them. |
| 3 | Odd one out – different blood cells |  | **LO: I can create a diagram to explain the circulatory system.**<br>Act out the circulatory system, then create own diagram.<br>Challenge for HA: compare circulatory systems of different types of animals | n/a |
| 4 | What is happening? – white blood cell chasing bacterium |  | **LO: I can describe the circulatory system from the perspective of a red blood cell.**<br>Write a diary extract/recount of a red blood cell – chn given diagram and key words for circulatory system.<br>Watch https://www.youtube.com/watch?v=-sBiCoCaofc for inspiration. | n/a |
| 6 | Concept cartoon – heart rate |  | **LO: I can plan a fair test.**<br>How does exercise affect heart rate? (fair test in groups with pulse monitors and stopwatches, using post-it planners). Then do another fair test, improving on previous based on teacher/peer feedback *(focus on planning, but will do whole investigation).* | Asthmatics to have inhalers with them.<br>Exercise to be done outside with plenty of space, away from tripping hazards. |
| 7 | Concept cartoon – handstand/pulse |  | **LO: I can create an exercise programme.**<br>In groups, create an exercise program for a group of Year 2s, you also have to explain to them why exercise is important (link to PE) | Asthmatics to have inhalers with them.<br>Exercise to be done outside with plenty of space, away from tripping hazards.<br>Y2 and Y6 teachers supervising. |

| | | | | |
|---|---|---|---|---|
| 8 | Odd one out –types of drug |  | **LO: I can explain the impact of drugs on the body.**<br>PSHE lesson on drugs. Afterwards, chn to design a poster in groups to inform/warn people about drugs | n/a |
| 9 | Concept cartoon |  | **LO: I can create a poem to explain how the digestive system works.**<br>Digestive system – teacher demo using Weetabix, milk, tights etc.<br>Write a rhyme/song/chant about the digestive system (using scientific vocab) – chn shown example poem and key scientific vocab. | Weetabix and milk to be kept away from chn with allergies (surfaces used washed thoroughly). |
| 10 | PMI – all-liquid diet |  | **LO: I can design a healthy balanced meal.**<br>Create a healthy dinner (art work on paper plates) – annotating the different food groups and what they are for. | Remind chn to use scissors carefully and not walk around with them. |

| Types of enquiry: | Opportunities to apply maths skills | Opportunities to apply writing skills | Opportunities to apply computing skills |
|---|---|---|---|
| ☐ Observing over time<br>☒ Pattern seeking<br>☐ Identifying and classifying<br>☒ Comparative and fair testing<br>☒ Research | Measuring heart rate<br>Drawing graph to show changes in heart rate<br>Timing events<br>Time (exercise program) | Account of red blood cell<br>Poster on drugs<br>Poem about digestive system | Measuring/data logging with pulse monitors |

**<u>Appendix B:</u> Example of a Concept Map**

Groups of pupils are given the key scientific vocabulary for the unit and write links between them. This can be used as an AfL strategy and pre- and post-unit assessment (different dates in different colours to show developing understanding).



## **Appendix C:** Bright Ideas Times

Bright Ideas Times (BITs) are dedicated slots (10-15 mins) at the start of each Science lesson for thinking, talking and developing ideas (in a context where there is no wrong answers). The Bright Ideas Time is one way of making sure that pupils are encouraged to use higher order thinking and it only takes a short time in each lesson to achieve this. The classroom ethos is important so that all ideas are valued and it is acceptable for pupils to take risks in their thinking and sometimes to be wrong.

The Bright Ideas Time was developed by an Oxford Brookes and EEF project and is a proven way of developing pupils' thinking, through discussing the big ideas which underpin the content of the primary science curriculum.

Structured prompts are used to stimulate creative discussion, designed so that there is not just one right answer. This encourages all pupils to contribute and to have their ideas valued.

The different prompts for BITs:

- Odd one out – examples at https://www.pstt-cpd.org.uk/ext/cpd/bright-ideas/media/More-Examples-of-Odd-One-out.pdf
- PMI (Positive Minus Interesting) – examples at https://www.pstt-cpd.org.uk/ext/cpd/bright-ideas/media/More-Examples-of-PMI.pdf
- Big Question – examples at https://www.pstt-cpd.org.uk/ext/cpd/bright-ideas/media/More-Examples-of-the-big-question.pdf
- Concept cartoon – see programme loaded onto school desktops (http://www.millgatehouse.co.uk/product/science-concept-cartoons-set-1/)

For more guidance see https://pstt.org.uk/resources/cpd-units/bright-ideas-in-primary-science for explanations, videos and examples.

# Appendix D: Skills progression across the year groups in 'Working Scientifically'

| | Working below Y1 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Working above Y6 |
|---|---|---|---|---|---|---|---|---|
| **PLAN** | • I can explore during play - test different ways of doing things. | • I can ask simple scientific questions. | • I can ask simple scientific questions and recognise that they can be answered in different ways. | • I can ask relevant scientific questions.<br>• I can suggest ways to explore a scientific question.<br>• I can make a prediction. | • I can ask relevant scientific questions.<br>• I can plan a simple enquiry to explore a scientific question.<br>• I can make a prediction with a reason. | • I can plan different types of scientific enquiry.<br>• I am aware of variables to control in an enquiry.<br>• I can make a prediction with a reason, using previous scientific knowledge. | • I can plan different types of scientific enquiry.<br>• I can control variables in an enquiry.<br>• I can use test results to make predictions and set up a further comparative fair test. | • I can ask questions and develop a line of enquiry based on observations of the real world and prior knowledge. |
| **DO** | • I can observe using all of my senses.<br>• I can explore during play - if I do something, is the result the same each time?<br>• I can compare two things. | • I can make observations.<br>• I can follow steps for a simple test.<br>• I can identify and compare things. | • I can use simple equipment to make observations.<br>• I can carry out simple tests.<br>• I can identify and classify things. | • I can set up a test to compare two things.<br>• I can set up a fair test.<br>• I can make careful and accurate observations.<br>• I can use different equipment to make measurements. | • I can set up a test to compare more than two things.<br>• I can set up a fair test and explain why it is fair.<br>• I can make careful and accurate observations, including the use of standard units.<br>• I can use different equipment, including thermometers and data loggers, to make measurements. | • I can measure using a range of equipment.<br>• I can measure accurately and precisely. | • I can measure carefully using a range of equipment.<br>• I can measure accurately and precisely, taking repeat readings when appropriate. | • I can select, plan and carry out the most appropriate type of enquiries to test predictions. |
| **RECORD** | | | • I can gather and record data. | • I can use diagrams to show what I have done.<br>• I can record data in tables. | • I can use scientific diagrams and keys.<br>• I can use tables and bar charts to present my data. | • I can draw scientific diagrams and labels, and tables.<br>• I can present data in scatter graphs, bar and line graphs. | • I can draw scientific diagrams and labels, classification keys and tables.<br>• I can present data using a range of graphs. | • I can make and record observations and measurement using a range of methods for different investigations.<br>• I can present observations and data, choosing appropriate methods. |
| **REVIEW** | • I can say what happened.<br>• I can order results (first, second, third)<br>• I can spot similarities and differences. | • I can suggest what I have found out.<br>• I can use my observations to answer questions. | • I can suggest what I have found out.<br>• I can use simple data to answer questions. | • I can use observations and knowledge to answer scientific questions.<br>• I can report my findings verbally.<br>• I can report my findings in writing.<br>• I can draw conclusions from my results. | • I can use observations and knowledge to answer scientific questions and generate further questions.<br>• I can report my findings in different ways, including oral presentations and written explanations.<br>• I can draw conclusions from my results and suggest improvements. | • I can report findings from enquiries in a range of ways.<br>• I can explain a conclusion from an enquiry.<br>• I can describe causal relationships in an enquiry.<br>• I can read, spell and pronounce scientific vocabulary accurately. | • I can report findings from enquiries in a range of ways.<br>• I can explain a conclusion from an enquiry.<br>• I can explain causal relationships in an enquiry.<br>• I can state whether evidence supports or refutes an argument or theory.<br>• I can discuss the reliability of my results.<br>• I can read, spell and pronounce scientific vocabulary accurately. | • I can interpret observations and data, including identifying patterns, to draw conclusions.<br>• I can evaluate the reliability of different methods and suggest possible improvements.<br>• I can present reasoned explanations, including data, in relation to predictions and hypotheses.<br>• I can evaluate data, showing awareness of potential sources of error. |