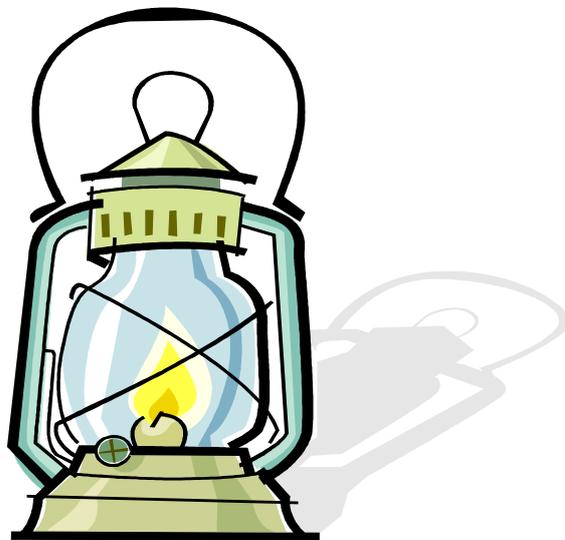




# *SCIENCE POLICY*



Autumn 2018



*"Shine like a lantern in the presence of the Lord."*

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## 1. The Philosophy of Science

Science in our primary school is an introduction to the world of living things, materials and physical processes. It is a largely practical subject which develops a spirit of enquiry built up through the experimental testing of ideas which encourages and develops the child's natural curiosity.

We believe that all children of this school must have regular access to science appropriate to their age and stage of development. Enjoyable scientific experiences foster confidence, encourage the ability to ask questions and helps children absorb the knowledge and skills associated with scientific methods of investigation. Through their powers of observation, prediction, investigation, and by interpreting their results children can, in collaboration with others, develop their knowledge about the world in which they live.

Learning opportunities will follow and build upon the National Curriculum guidelines.

### Aims

- To develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics.
- To develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them.
- Children are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

### Intended Outcomes

Children will be given opportunities to:

- Develop their understanding through systematic enquiry, using both first hand and secondary sources as appropriate.
- Use ICT to collect, store, retrieve and present scientific information.
- Relate their work in science to every day life.
- Consider simple scientific ideas and the evidence for them and, at Key Stage 2, also to collect evidence to test scientific ideas in a variety of ways.
- Communicate scientific ideas and observations using appropriate scientific vocabulary.
- Present information in a variety of ways including drawings, diagrams, tables and charts and in speech and writing; at Key Stage 2, children should also use standard units of measurement and include graphs to record and present information.
- Consider health and safety in the context of their science work and take action to control risks.
- Develop the ability to work both independently and in collaboration with others.
- Develop their understanding of scientific concepts.
- Develop the ability to devise and safely carry out investigations and other practical work.
- Develop the ability to communicate ideas using appropriate methods.
- Develop enthusiasm for science.

## 2. The National Curriculum

The programmes of study describe a sequence of knowledge and concepts. While it is important that children make progress, it is also vitally important that they develop secure understanding of each key block of knowledge and concepts in order to progress to the next stage.

'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. These types of scientific enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative and fair testing (controlled investigations); and researching using secondary sources. Children should seek

answers to questions through collecting, analysing and presenting data.

Children should read and spell scientific vocabulary at a level consistent with their increasing word-reading and spelling knowledge at Key Stage 1 and into Key Stage 2.

### **3. Classroom Management**

From September 2014 the school has adopted the 'Switched on Science' scheme (Appendix 1) for the new primary programme of study for science. This ensures full coverage of the content for each year group and more, ensuring that children are given access to lively ideas and ways of working scientifically in a range of contexts, thus providing appropriate repetition and reinforcement which helps to ensure retention. A broader curriculum in science will be delivered in EYFS making links with other areas of the curriculum. At the start of every unit, there is a starter activity which aims to elicit what children already know about the area of science they will be learning.

Children will be provided with opportunities to generate questions to investigate, predict and hypothesise. Further opportunities are given for children to experience using variables, including measuring and observation of these. As the children move into Key Stage 2, evidence shows children regularly use tables and occasionally graphs to represent and then interpret results. Teachers will use their flair, enthusiasm and professional judgement to identify the most sensible, enjoyable and safe methods for the work being conducted.

There are a variety of ways in which teaching may be effective and our school encourages learning through investigation with lots of first hand experience. It is, however, frequently acceptable to demonstrate, use illustrative activities, research and explore with individuals and groups according to the need assessed.

Children are encouraged to work as individuals, in pairs, in groups and also as a whole class, when appropriate.

Interactive display is used to celebrate children's work and extend their learning.

### **4. Early Years Foundation Stage**

Science in the foundation stage is based on developing children's knowledge and understanding of the world around them, as well as developing their scientific skills. Children will be provided with the opportunities to explore science first hand. Children will also be encouraged to use scientific vocabulary to express their observations and experiences.

### **5. Children recording their work**

At all levels co-operation and considerate safe codes of conduct should be praised and encouraged. Children are taught to use a variety of means of communicating and recording their work.

In Year 1 and 2 children have a simple format of observational questions to follow as a guide (Appendix 2) and a simple layout for their investigational work (Appendix 4).

In Years 3 - 6 children are encouraged to develop more independence in carrying out investigation, especially fair testing. The use of tables and graphs is encouraged in the recording of results and they base their conclusions on scientific knowledge (Appendix 3) and there is an investigational layout to be used for practical work. (Appendix 4)

### **6. Assessment**

Children are assessed in science twice per unit, using materials from Switched on Science and Rising Star Assessment, on their subject knowledge and their scientific enquiry skills. They are given a pre-test before the unit to test what they already know and a post-test to see what they have learnt. Their work is levelled and a copy of this information is kept in the science assessment folder.

### **7. Evaluation and Monitoring**

The science policy of the school is reflected in our practice. This is monitored by the Science Leader and is reviewed annually by the staff. New members of staff will be introduced to the policy by the Science Leader and the members of staff in the same year group will team plan.

The Science Leader will monitor books and displays regularly to ensure work is appropriate to the age group and in line with the school policy and schemes of work.

The Science Leader will observe the teaching and learning of science across the school at least once a year.

Success of our science teaching will be judged by:

- the motivation and interest displayed by our children
- the development, over time, of children's understanding of scientific concepts and processes
- Children's ability to apply their understanding in a variety of new situations

## **8. Equal Opportunities and Special Needs**

Teachers will have high expectations of all children regardless of gender, race, class and special needs.

Teachers will strive to ensure that all children have equal access to the science curriculum. Planning will be differentiated so that all children can participate and reach their full potential.

## **9. Information and Communication Technology**

Computers are used throughout the school to enhance the work of the children. Children from Year 3 upwards are able to work on their own mini-laptops.

Children use the internet for research in both the classroom and the ICT suite. There are also a range of interactive activities located online that children can use to further develop their scientific knowledge. We also have a range of programs to communicate children's ideas and findings. Digital cameras can be used to record evidence of practical work.

## **10. Role of the Science Leader**

The Science Leader leads focused inset sessions and selects and orders loans, new equipment and book materials as appropriate. The staff are updated regularly as a result of the Science Leader attending inset courses and disseminating information.

The Science Leader also help individual teachers by assisting in planning, offering support in class and providing relevant scientific background for non-specialist teachers.

## **11. Health and Safety**

It is the responsibility of the staff to adhere to all safety measures in the school Health and Safety Policy. (Appendix 6)

In accordance with The Department for Education Statement dated 28<sup>th</sup> November 2011, when children work with tools, equipment and materials, in practical activities and in different environments, including those that are unfamiliar they are taught:

- about hazards, risks and risk control
- to recognise hazards, assess consequent risks and take steps to control the risks to themselves and others
- to use information to assess the immediate and cumulative risks
- to manage their environment to ensure the health and safety of themselves and others
- to explain the steps they take to control risks.

The school has a risk assessment form which focuses on health and safety issues surrounding the teaching and learning of science.

## **12. Organisation of Science Resources**

Classrooms are equipped with a selection of books that are age-appropriate and support the science curriculum. In Key Stage 1 and 2 teachers have access to books from the Rising Stars "Switched on Science" Scheme of Work, Switched on Science activity book and other useful websites.

Resources are stored in the resources cupboard and boxes are numbered according to the units of work they support. (Appendix 5).

The school grounds are a valuable resource also. Children will become familiar with animal life, plant growth and seasonal change by visiting the gardens at least once a term.

## St Bede's Science Curriculum Map (2018-2019)

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Nursery*						
Reception*						
Year 1	Animals Including Humans (Who Am I?)	Light (Celebration)	Everyday Materials (Polar Adventures)	Plants (Treasure Island)	Habitats (On Safari)	HOLIDAY
Year 2	Animals Including Humans (Healthy Me)	Use of Everyday Materials (Material Monsters)	Plants (Young Gardeners)	Sound & Forces (Move It)	Living Things and Their Habitats (Mini Worlds)	LITTLE MASTER CHEF
Year 3	Rocks (Earth rocks)	Animals including humans (Food and our body)	Forces & Magnets (Opposite attract)	Light (Mirror, Mirror)	Plants (How does your garden grow?)	WE ARE ASTRONAUTS
Year 4	State of matter (Looking at States)	Animals Including Humans (Teeth & Eating)	Living Things and Their Habitats (Living things)	Electricity (Power it Up)	Sound (What's That Sound)	BRILLIANT BUBBLES
Year 5	Earth and space (Out of this World)	Properties and changes of materials (Material World)	Living Things and Their Habitats (Circle of Life)	Forces (Let's Get Moving)	Animals Including Humans (Growing Up & Growing Old)	SUPER SCIENTISTS
Year 6	Evolution and Inheritance (We're Evolving)	Animals Including Humans (Staying Alive)	Living Things and Their Habitats (Classifying Critters)	Light (Let It Shine)	Electricity (Electrifying)	WE ARE DINOSAUR HUNTERS

## SWITCHED ON SCIENCE TOPICS

\*In the EYFS, science is covered under the area of learning "Knowledge and Understanding of the World." This is incorporated into the topic-based curriculum that Early Years follows based on children's interests throughout the topics. Children will be graded at the end of Nursery and Reception in the following way: Working Towards, Secure, and Exceeding. Please see Phonics data for more details.

*"Shine like a lantern in the presence of the Lord"*

### Working scientifically

During Years 1 and 2, children should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions

During Years 3 and 4, children should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

During Years 5 and 6, children should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments

Experimental and investigative Science  
Key Stage 1

1. **Planning experimental work**  
**Ask questions and predicting**

Thinking ahead  
Suggest ideas  
Ask questions  
Make predictions  
Know what order to test in  
Think forward

- Suggest ideas
- Change ideas into investigations
- Think about what might happen
- Use predictions in plan
- Be able to tell when a test is fair

2. **Obtaining Evidence**  
**Observe, measure and manipulate variables**

Doing it  
Observe/measure  
What kind of measurements?  
When to measure  
How to record observations & measurements

- use senses
- observe/measure
- record observations
- record measurements

3. **Considering Evidence**  
**Interpret results and evaluate**

Thinking about what you did and your result  
Think about what the observations & measurements tell you  
Were your ideas and predictions any good?  
Tell other people

- communicate what happened
- use drawings, tables & graphs
- make simple comparisons between results
- look at results and think about what they tell you
- think back to predictions, were they any good?
- use your knowledge to explain what happened and what your results tell you.

EXPERIMENTAL & INVESTIGATIVE SCIENCE

KEY STAGE 2

1. Planning Experimental Work

**Thinking Ahead**

Turn ideas into investigations

Think forward, suggest what might happen and use it to help you plan.

Plan for fair test, take useful measurements

- Suggest ideas for investigation
- Change own and other people's ideas so they can be investigated
- Think about what might happen to help you plan your investigation
- Decide what observations and measurements to collect
- In the investigation:
  - change some things
  - keep some things the same
  - observe, measure something
- Think about what equipment to use

2. Obtaining Evidence

**Doing It**

Think about the kind of observations or measurements you will take.

What kind, when, how many?

- Use equipment correctly
- Make careful observations
- Take accurate measurements
- Check observations and measurements are correct, repeat three times for a fair test

3. Considering Evidence

**Thinking about what you did and your results.**

What did your results tell you?

How well do you think you did in your investigation?

Use your knowledge to explain what happened.

- Know when to use tables, bar charts and line graphs. Note patterns and trends (i.e. which direction results are going)
- Think about what the results say
- Come to a conclusion
- Think about whether your prediction was a good one
- Use your knowledge to help you understand what happened and explain your conclusions.
- Improvements

### Investigation layout in Key Stage 1

- What do I want to find out?
- What things will I need?
- What I think will happen?
- How will I make it a fair test?
- What did I do?
- What did I find out?
- Were my predictions right?

### Investigation layout for Key Stage 2

Aim

Hypothesis/prediction

Diagram

Equipment/apparatus

Fair test-independent and dependent variables

Method

Results-written, tabulated and graphed

Conclusion

Improvements/Evaluation

**Topics and which science box to find them in**

Box 1 = Forces

Box 2 = Various teaching books on different science topics

Boxes 3, 7 and 16 = Materials

Box 4 = Sound

Box 5 = Essentials for investigation

Box 6 = Light and shadow

Boxes 8, 9 and 17 = Electricity

Box 10 = Earth, moon and sun

Box 11 = Rocks and soil

Box 12 = Solids, liquids and gases

Box 13 = Plants and mini-beasts

Boxes 14 and 15 = Human body

Box 18 = Magnification

*Bottom of the cupboard:*

*Intel computer microscope      900 power microscope      2 x metal clamps*

*Control box                          Electric scales                          Electric box*

*Body/Organs model                  Wind/Weather kit                          Ramps*

## Safety Measures

The following points should be clearly understood by staff and children before beginning any science or technology work. Explaining the safety points to the children as appropriate is a valuable way to spend teaching time.

1. Children should not run when carrying equipment
2. Plastic should be used wherever possible, i.e. pots and mirrors
3. Plastic bags can cause suffocation and should be carefully supervised
4. Balloons, especially when burst should be disposed of as they can cause suffocation
5. Polystyrene should not be used with infants and only under supervision with juniors as it can cause choking if eaten
6. Children have to carry scissors with the handle uppermost and need strict supervision when using knives. Sawing should be supervised and only completed with appropriate age group.
7. With naked flames children should have their hair tied back and ties tucked away in case of fire. Water should be available nearby in case of an accident. Candles should be stood in trays of sand and any utensils used should have wooden handles.
8. Matches should only be used under strict supervision. Matches should be kept out of childrens' reach when not in use.
9. Children should not look directly at the sun even through dark glasses or plastic. They should not look directly at any intense source of light.
10. Liquids which produce flammable vapours should not be used
11. Any liquid or object that may be immediately spilt should be cleaned up immediately in case it may cause any person to slip
12. Mains electricity should not be used for electricity and magnetism experiments in school
13. The use of glue guns should be supervised and preferably gloves worn when being used
14. Tasting of substances should be strictly supervised, not only because of choking, but because there is a chance of an allergic reaction
15. Hands should be washed before and after some activities. Equipment should be disinfected if it goes in the mouth
16. Children should be closely supervised near the pond
17. Food experiments should not be left uncovered i.e. observing foods' deterioration over a period of time
18. Children should be told that some plants are poisonous. Leaves and berries of a poisonous nature should not be used in the classroom
19. Hands should be washed, particularly after handling animals or soil
20. Any scratches or cuts should be dealt with immediately if resulting from contact with animals
21. All electrical equipment should be kept away from water i.e. DO NOT use a hairdryer to power a boat in a tray of water