Science Policy

Believe **E**njoy **S**ucceed **T**ogether

"I can do everything through God who gives me strength"
Philippians 4:13

Cronton CE Primary School

The KEYS Curriculum

Knowledge and skills
Empower
You to
Succeed

Keys To Success


Knowledge

Skills

Vocabulary

Curriculum Intent

Our Curriculum has been designed by Cronton CE to provide a bespoke, unique and exciting curriculum that is tailor-made to suit our children, their learning and their futures. Every child is unique and important. They are at the centre of their learning; starting as part of a class, whole school, the local community and then on to their future role in modern Britain and as a future global citizen. Our KEYS curriculum develops each child and the understanding that **K**nowledge and skills **E**mpower **Y**ou to **S**ucceed.

We maintain a broad and balanced approach to our curriculum, which alongside English and Mathematics will provide our children with skills, knowledge and vocabulary rich experiences that excite and engage. We will foster attitudes and qualities which will enable them to become confident, caring, respectful and responsible citizens. We offer a spiritual, moral, social and cultural experience for all through our curriculum and also through extra-curricular clubs and activities, day trips and residential experiences in KS2. We use a wide variety of resources to assist us in delivering this bespoke curriculum including specialist teachers, visits and curriculum enhancements and ensure links and relationships are meaningful to the children and their learning.

Our curriculum is planned to ensure it will build upon what children already know in a sequential way to give them powerful knowledge and skills while making relevant links to secure their understanding of the world around them. We ensure that all children receive quality first teaching for every subject with high of expectations for all. We provide a quality education that is inclusive and equips our children to be lifelong learners.

Our KEYS Curriculum:

Develops each child with, **KNOWLEDGE, SKILLS** and **VOCABULARY**. It is broad, balanced and has clear progression which is sequential in these areas

It is filled with rich purposeful first-hand experiences and uses sourced expertise. It develops values and the learning attitudes of **INDEPENDENCE**, **PERSERVERENCE, CURIOSITY, TEAMWORK** and take **RESPONSIBILITY** to always be the **BEST** we can be.

We want our children to show **RESPECT** and have **RESPONSIBILITY** to each other and in all aspects of life. It embraces children's knowledge and understanding of the developing world we live in, from our **COMMUNITY**, modern multi - cultural Britain and as a Global Citizens of the future.

Introduction

From an early age, children are natural scientists and will readily use their senses to discover the world around them. They are astute observers and, as many parents will recognise, usually ask lots of questions about their immediate experiences. This is the start of scientific enquiry and at Cronton we fully understandthat science is about channelling and building on this innate curiosity, to foster a love and understanding of science that will stay with the children throughout their education and into their futures.

Intent

At Cronton we believe that a purposeful, accurate and imaginative science education from EYFS to Y6provides the foundations for interpreting the world. We also firmly believe that an understanding of environmental science is vital for the Earth's future and because of this we have developed a unique science curriculum, which includes an environmental science topic for each year group.

The science curriculum has been planned to ensure coverage of all National Curriculum objectives,including working scientifically across KS1 and KS2. The statutory framework for the Early Years Foundation Stage is followed in nursery and reception, with the scientific aspects of the children's tasks setout within the framework.

Through our inclusive science curriculum, we aim to:

- Provide interesting experiences, with plenty of opportunity for exciting scientific enquiry that will challenge the children's own ideas and any misconceptions that they may have, to help them todevelop as scientists.

- Foster an enthusiastic, open-minded attitude towards science based on the skills of curiosity, independence of thought, co-operation, perseverance and self-criticism.

- Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics, in a progressive manner which encourages all children to retainknowledge across year groups.

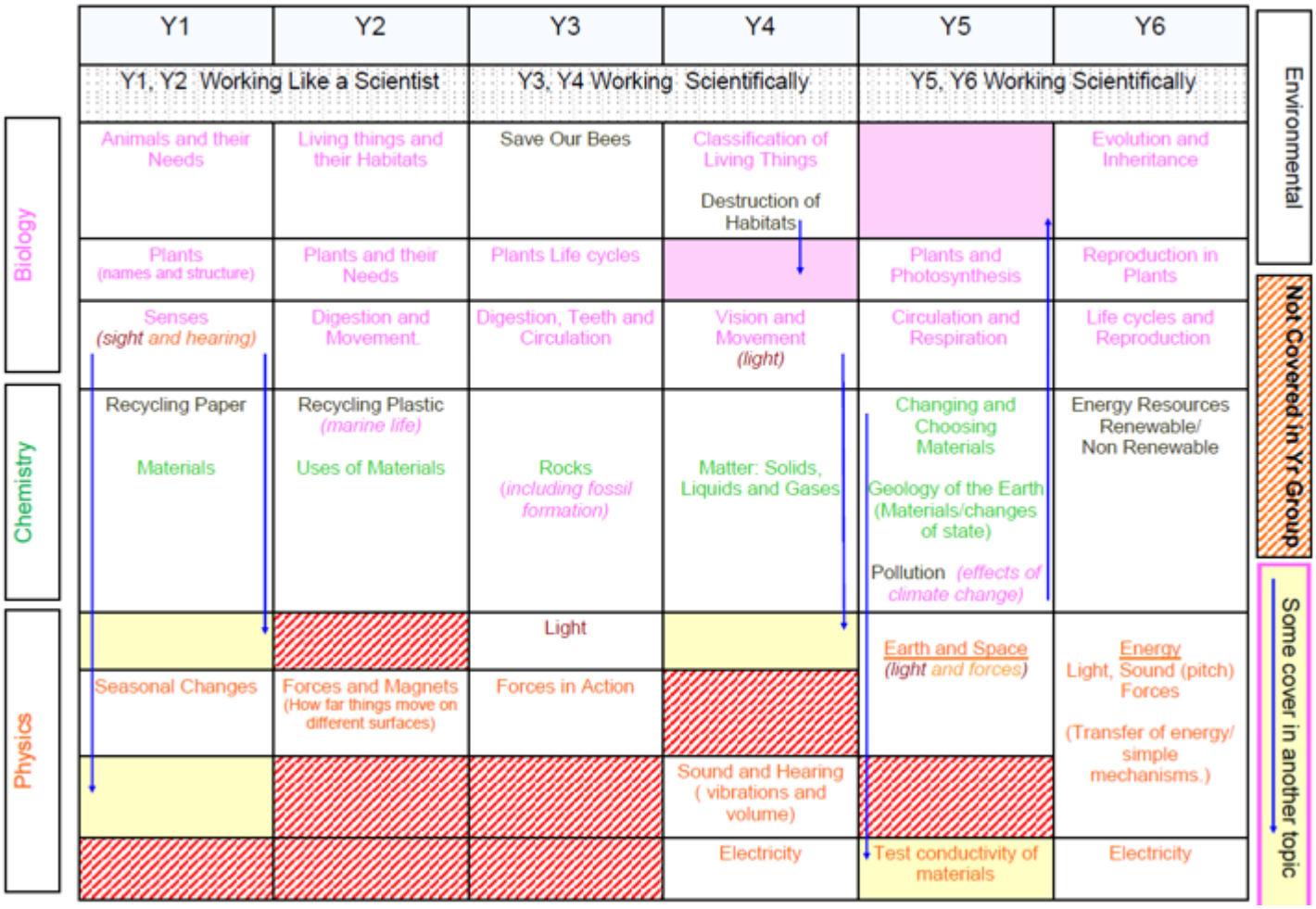
- Foster an awareness of the links between biology, chemistry and physics and environmentalscience to help develop a respect for the environment and living things.

- Develop an understanding of the nature, processes and methods of science (plan, do, review) through the different types of science enquiry: Identifying and classifying, modelling, pattern seeking,researching, observing over time and comparative and fair tests.

- Help children to recognize and assess risks and hazards to themselves and to others when working scientifically and to take action to control them.
- Encourage the development of scientific vocabulary across year groups by ensuring that key vocabulary from similar topics (strands) becomes progressively more challenging as the children move through school. This key vocabulary is mapped out to show progression across year groupsand is given on medium term planning and on the children's topic Keys.

- Take our children beyond the National Curriculum and promote their science capital in as many diverse ways as possible to help them understand the uses and implications of science, today andfor the future.

The science topics have been carefully mapped out across biology, chemistry and physics, as shown below, to allow a revisit of content, concepts and skills, in increasing depth and with greater challenge, asthe children progress through each year group. By consistently building on prior knowledge and skills, it will maximise the likelihood that the children will remember it over time.



1. Implementation

Science is taught as a discrete lesson for 1.5 hours in KS2 and 1 hour in KS1each week and where appropriate cross curricular links are formed. The curriculum is organised into six topics per year group, one of which is anenvironmental science topic that runs alongside our school Eco-Avenger initiative. Topics are taught across six weeks, apart from environmental science topics which are completed over three weeks.

To ensure that our children are exposed to an increasing challenge across science topics, teachers use medium term plans that have been produced for each year group, to inform lesson planning. These plans are accessed online through the teacher share point.

Medium term plans specify:

- Topic links to our school key values.
- The Big Question
- Lesson objectives
- National Curriculum statementslinked to the topic.
- Key knowledge to be addressed
- Prior Knowledge
- Future knowledge
- Book linked to topic
- Science enquiry types and Cronton science characters to be referenced with the children.
- Working scientifically skills for each year groupto be referenced as plan, do and review with the children.
- Key vocabulary (sequenced) to be used when working scientifically.
- Key topic vocabulary (sequenced)

Cronton C.E. Primary School Subject Medium Term Plan- Science

Theme classification of living things Hours 6 Year Group 4 Term Autumn Strand Biology

Key Learning attitudes	Christian Value Links	British Value Links
Independence curiosity Perseverance responsibility Teamwork	Generosity Hope Service Justice Friendship Humility Perseverance Creativity Compassion Responsibility Courage Forgiveness Truthfulness Respect Trust Thankfulness Peace Wisdom	Mutual Respect Rule of Law Individual Liberty Democracy Tolerance of Different Cultures and Religions

NC Links

- Recognise that living things can be grouped in a variety of ways
- Explore and use classification keys to help group, identify and name a variety of living things in their local andwider environment
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

Big Question How can plants and animals be grouped?

Sequence of Lessons

I can recognise that living things can be grouped in different ways
I can explore and use classification keys
I can describe how plants and animals (including micro-organisms) are classified into groups looking at similaritiesand differences.
I can construct and interpret food chains: identifying producers, predators (consumers)and prey (consumer).
I can understand the role of decomposers in the food chain.
Assessment lesson

At the end of the topic - Pupils should know:

Pupils should know at the end of the topic :

- Living things, plants and animals, can be grouped in a variety of ways and that this is called **classification**.
- **Classification keys** can be used to identify and name living things.
- **Carl Linnaeus** was a scientist born in 1707 who was famous for developing a classification system to identifyand name living things.
- Plants and animals are the two main groups for classification—plants can make their own food whereasanimals cannot. However there are other livings things that do not fit into these two groups e.g. **micro- organisms** such as **bacteria and yeast**, and toadstools and mushrooms.
- Animals can be divided into two main groups – those that have backbones (vertebrates) and those that donot (invertebrates).
- Vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Each grouphas common characteristics.
  - **Fish**: **aquatic** animals, breathe through gills, **cold-blooded**, most have scales, most develop from eggsthat the female lays outside her body.
  - **Amphibians**: live part of their life cycle in water and part on land, have gills when young, later developlungs, cold-blooded, usually have moist skin.
  - **Reptiles**: hatch from eggs, cold-blooded, have dry, thick, scaly skin
  - **Birds**: **warm-blooded,** most can fly, have feathers and wings, most build nests, hatch from eggs, most baby birds must be fed by parents and cared for until they can survive on their own (though some,like baby chickens and quail, can search for food a few hours after hatching)
  - **Mammals**: warm-blooded, have hair on their bodies, parents care for the young, females produce milkfor their babies, breathe through lungs, most are **terrestrial** (live on land) though some are aquatic
- Invertebrates can be divided into a number of groups including insects, spiders, snails and worms.
- Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.
- Use keys and classification systems to identify plants and animals in the immediate environment.
- Introduce some unfamiliar plants and animals from a broad range of other habitats to classify using a key.
- That predators eat other animals (prey)
- Know some examples of animals which are predators and their prey eg birds feed on insects, foxes feed onrabbits, herons feed on fish
- That a food chain consists of producers, consumers(predators and prey) and decomposers.
- That a food chain is the transfer of energy from one species to another. All living things need energy for growth and health. Within a food chain, some living things create the energy (producers), plants and some use the energy (consumers). Animals are consumers, because they have to eat other animals and plants

Prior Knowledge:

Y2 Topic 2 Recycling Plastic:
How plastic affects marine life.
How plastic affects marine life.

Recognise that living things can be grouped. Identify by structure and name fish, amphibians, reptiles, birds and mammals and know examples of herbivores, carnivores and omnivores. Identify that most living things live in habitats to which they are suited and are dependent on. Use a simple food chain to describe how animals obtain their food from plants and other animals.

Y2 Topic 4 Living things and their habitats:
Recognise that living things can be grouped. Identify by structure and name fish, amphibians, reptiles, birds andmammals and know examples of herbivores, carnivores and omnivores. Identify that most living things live in habitats to which they are suited and are dependent on. Use a simple food chain to describe how animals obtain their food from plants and other animals.
Recognising the distinguishing characteristic of insects and the life cycle of the bee.Know why bees are dying and how to be bee friendly.

Y3 Topic 5 Save Our Bees
Save Our Bees:
Recognising the distinguishing characteristic of insects and the life cycle of the bee.Know why bees are dying and how to be bee friendly.

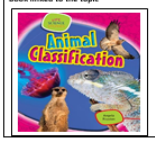
Future Knowledge:

Y4 Topic 6: Destruction of Habitats:
Recognise that habitats can change and that this can endanger a species by affecting food chains.

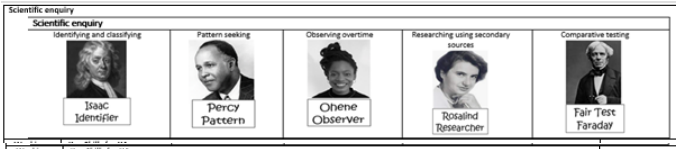
Y5 Topic 5: Pollution
Recognise why it is important for living organisms to keep the environment pollution free.

Y6 Topic 6: Life Cycles and Reproduction:
Describe the differences in the life cycles of a mammal, an amphibian an insect and a bird.

Book linked to the topic



Scientific enquiry



Working Like a Scientist:	Key Skills for Y4
Plan	I raise relevant questions. I help to make decisions about : *The appropriate method (enquiry type) to use to answer a question recognising when a fair test is necessary. Which observations to make and how long to make them for.* *How to collect and record data. Which equipment to use.* I make predictions. I talk about criteria for grouping, sorting and classifying. I recognise when and how secondary sources might help me to answer questions that cannot be answered through apractical investigation.
Do	I set up practical enquiries, comparative and fair tests. I make systematic and careful observations. I take accurate measurements using standard units: learning how to use a range of equipment such as data loggersand thermometers. I begin to look for naturally occurring patterns and relationship. I group, sort and classify using simple keys. I collect and record data from observations/ measurements using scientific language, bar charts, tables, drawings,labelled diagrams, keys.
Review	I help to make decisions about how data can be analysed—looking for patterns, relationships, changes, similaritiesand differences from scientific ideas. I use results/ evidence to draw conclusions and make predictions for new values within or beyond the data I havecollected. I report on findings using scientific vocabulary, including oral and written explanations, displays or presentations ofresults and conclusions . I identify new questions arising from the data and find ways of improving what I have already done.

Key vocabulary
vertebrates, fish, amphibians, reptiles, birds, herbivore, carnivore, terrestrial/ aquaticmammals, omnivore, warm blooded/ cold blooded invertebrates, insects, spiders, snails, worms, producer, predator, prey, food chain, energy Carl Linnaeus plants—flowering and non-flowering consumer, decomposer micro– organisms, bacteria, yeast

Key Vocabulary for the subject on KEYS sheet

Classification/ classify - Grouping living things in a variety of ways.
Food chain - The transfer of energy fromone species to another.
Predator - Eat other animals—prey
Decomposer - Organisms that break downdead or decaying matter.
Key - Used by scientists to identifyOrganisms.
Analyse - Look at in detail.
Producer - Producers are any kind of green plant as they make their own food
Consumer - any organism that can't make its own food

Resources
key knowledge organiser
Enrichment ideas

On keys

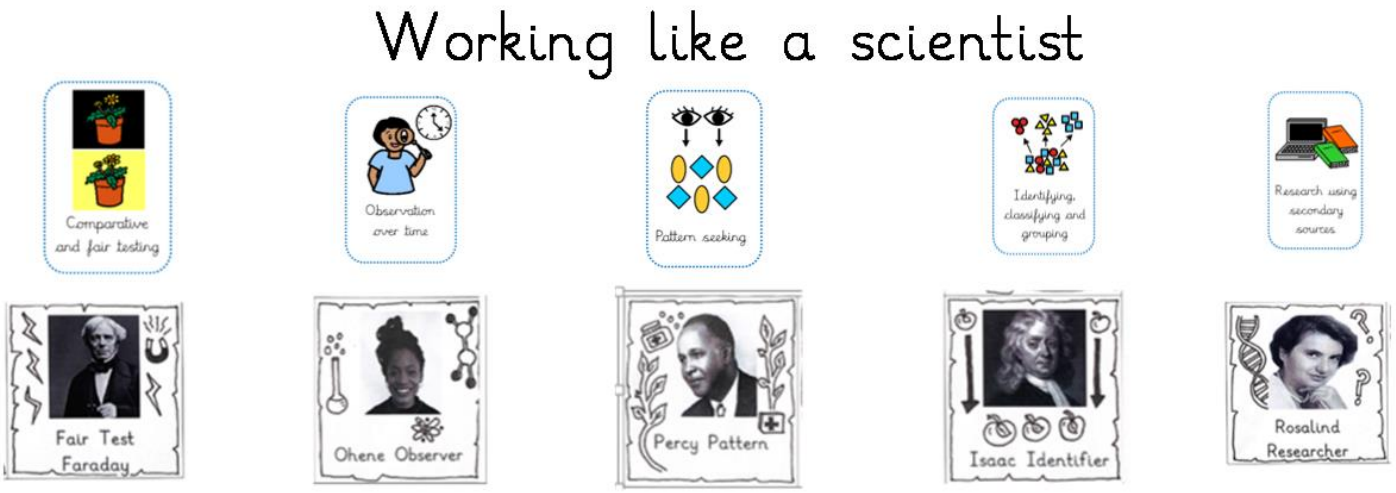
- Common misconceptions

The Big Question

Each new topic is introduced with 'The Big Question' for that topic and from this the children complete a prior assessment. 'The Big Question' is addressed in each lesson to assess development in understanding of the science topic.

Cronton Science Enquiry Characters

Lessons allow for a wide range of scientific enquiry and children are encouraged to 'work like a scientist' at KS1 and 'work scientifically' at KS2. Children will be taught to describe processes and key characteristics ina common language across school. From Y1, to help the children decide how they are going to carry out an enquiry and remember the different enquiry types, the children are introduced to our school science enquiry characters which are linked to famous scientists.



Keys to Success

Key knowledge organisers are provided for each topic. These clearly show:

KEY Knowledge

KEY Skills

KEY Vocabulary

Through the "KEYS" our children will be able to clearly see the expectations in knowledge for each topic. The keys will be given to the children at the beginning of each topic and referred to during a science lesson. They will also be placed on the website to encourage further independent learning and research.

Special Educational Needs & Disabilities (SEND) and Working at Greater Depth

At Cronton, we ensure that all children are challenged at a level appropriate to their ability. Sciencelessons are inclusive to pupils with special educational needs and disabilities and teachers have a responsibility to

provide support for children with SEND: In science this can be in the form of:

- TA support.
- Questioning to address misconceptions.
- Using graphic word mats to help with retention of key topic vocabulary.
- Pre-learning.

At Cronton we provide sufficient challenge for children who are working at greater depth by:

- Asking them to make connections between different areas of science to build larger concepts.
- Fostering greater independence in enquiry—referring to working scientifically skills in higher year groups.
- Applying their knowledge in new and unfamiliar contexts.
- Encouraging deeper thinking through questioning.

Greater depth in science at Cronton relates to how the children use their knowledge and skills to build ideas, speculate and enquire i.e. enquiry skills rather than learning facts are extended.

Equal Opportunities

Positive attitudes towards science are encouraged, so that all children, regardless of race, gender, abilityor special needs, including those for whom English is a second language, are able to develop their scientific knowledge and skills.

Health and Safety

As in all areas of the curriculum the safety of the children is paramount and they are taught how to use equipment safely and correctly during science lessons.

Staff plan for health and safety in science lessons by referring to the Be Safe 4th Edition: Health & Safetyin School Science & Technology for Teachers of 3-12 Year Olds. This book is kept in the science resource cupboard (door) and provides advice on:

- Risk assessment
- Food hygiene
- Studies outside the classroom
- Making things safely
- The safe use of chemicals, animals and plants

Science Resources

We are continually developing our resources for the teaching of science. Most resources are kept in a central cupboard (outside Y3) where there are clearly labelled boxes of equipment. Staff have their own digital copy (photographs and quantity) of resources linked to science topics to help with planning and thiscan also be found on the teacher share point.

Educational Visits and Visitors

Educational visits and visitors are linked to science, including visits to Jodrell Bank and the Catalyst Museum. Knowsley Environmental team visit each class during their environmental topic and parents withscientific jobs are actively encouraged to come and visit us. Appropriate health and safety risk assessments are carried out.

Impact

Assessment

Assessment is an integral part of the teaching and learning of science at Cronton and is a continuousprocess.

Teachers use a variety of methods to assess the children and these include:

- Observing children at work (individually, in pairs, in a group and in classes).
- Questioning, talking and listening to children's discussions or oral presentations.
- Discussing 'The Big Question' for each topic regularly to show development in understanding.
- 'Quick quizzes' and games for assessment and retrieval at the start of a lesson.
- End of unit quizzes and working scientifically TAPS assessment lessons to show attainment.
- Regular marking of written, pictorial or graphical work- analysing errors and picking up on any misconceptions; adding questions to correct or extend learning where needed.
- In the Foundation Stage we assess children's knowledge and understanding according to the EYFSLearning and Development Stages.

These ongoing assessments inform future planning and teaching. Lessons are adapted readily and shortterm planning evaluated in light of these assessments. The Teacher assessments are placed on an Excel sheet to support the Subject Leader and assess progress. At the end of each year teacher's make a formal comment on each pupil's progress in science on their end of year report.

Expectations

Knowledge

The science curriculum ensures that our children will have a greater understanding of how the world works: based on the scientific disciplines of biology, physics and chemistry, and through environmental science will be aware of, why we need to, and how we can help to, take care of the Earth.

Children working at the expected level (knowledge) will have a good understanding of the key knowledge listed on medium term plans for each topic. All children will have made progress from their starting point and have the opportunity at working within the expected level (knowledge). The children will have a clear view of our expectations from their topic Keys.

Working Scientifically

By the end of KS1, our children will be able to 'work like a scientist' by:

Planning an enquiry with support:

- Asking questions and starting to suggest how to find things out:
    - *Knowing the different enquiry types and with support choose which one to use.*
    - *Choosing equipment and how to record data from a limited range of given ideas.*

- Making a simple prediction.

Doing an enquiry:

- Recognising when a test is unfair, with support.
- Observing and using equipment accurately.
- Using key vocabulary correctly: working scientifically and knowledge vocabulary.
- Comparing things and sorting and grouping them.
- Recording simple data in different ways.

Reviewing an enquiry:

- Beginning to draw simple conclusions by talking about observations and deciding whether it was what was expected.
- Suggesting improvements to an enquiry

By the end of KS2 our children will be able to 'work scientifically' by:

- Using previous science experience to explore ideas and raise different kinds of questions.
- Talking about how scientific ideas have developed over time and how evidence hasbeen used to support or refute ideas.

Planning an enquiry <u>independently</u>:

- Choosing an appropriate enquiry type to answer a question, from:
    - *Identifying and comparing*
    - *Modelling (not statutory)*
    - *Looking for patterns*
    - *Researching: Being able to recognise which resources will be most useful and sep-arating opinion from fact.*
    - *Observing over time*
    - *Fair and comparative testing*: *recognising when a fair test is necessary and identifying/ naming independent (the one thing beingchanged), dependent (what is being measured) and controlled (what stays the same) variables.*
- Deciding which observations to make, how long to make them for and which measurements to use.
- Choosing which equipment to use, how to collect and record data from a choice of familiar approaches.
- Deciding if repeat readings are necessary to increase accuracy and calculating themean of repeat readings.
- Making predictions based on experience.
- Researching using secondary sources—recognising which resources will be mostuseful and separating opinion from fact.

Doing an enquiry:

- Setting up an enquiry recognising and controlling variables where necessary.
- Taking measurements, using a range of scientific equipment, with increasing accuracyand precision: taking repeat readings, when appropriate and calculating the mean.
- Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.

Reviewing an enquiry:

- Looking for relationships in data and identifying evidence that supports or refutes predictions.
- Using test results to make predictions to set up further comparative and fair tests.
- Evaluating data showing an awareness of potential sources of error and whether anenquiry needs to be repeated.
- Reporting and presenting findings from enquiries, including conclusions in oral and written form such as displays and other presentations.

Role of the Science Subject Leader

- To lead in the development of science throughout the school.
- Help form policy development and the production of medium term plans; designed to ensure progression and continuity in science throughout the school.
- To support colleagues in their development of detailed short term plans and implementation ofthe scheme of work, assessment and record keeping activities.
- To monitor the planning, teaching and learning of science throughout the school.
- To provide teachers with support in the teaching of science and to provide staff with CPD opportunities in relation to science within the confines of the budget and the School ImprovementPlan
- To monitor and maintain high quality resources.