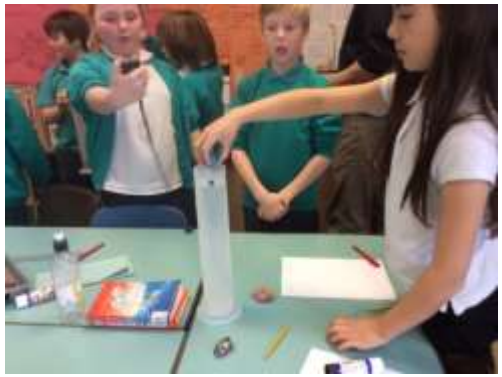
St Helen's
CE Primary School

Science Curriculum Overview

Contents:


Section 1: Intent Rationale: Science at St.Helen's

In order for all children to achieve their full potential and to aim for our school vision of '**Excellence, Enjoyment and Achievement' - Flying high- Soar like Eagles,** we have developed a Science scheme of work which enables children to develop their Scientific knowledge and understanding to prepare them for their next phase of their learning and the opportunity to develop their core Science enquiry skills through opportunities for practical work.

A high-quality Science curriculum **inspires** all pupils to **succeed** and **excel** in the subject. Opportunities to complete practical activities working alongside their peers in the classroom, also helps them to build character and help to embed some of our school values such as: **Friendship, Perseverance**, **Truthfulness, and Respect**

Quality First Wave Teaching:

All children receive a broad and balanced Science curriculum as part of QFWT (Quality First wave Teaching) this is about what should be on offer for all children: the effective inclusion of all pupils in high-quality everyday personalised teaching. Such teaching will, for example, be based on clear objectives that are shared with the children and returned to at the end of the lesson; carefully explained new Scientific vocabulary; use of lively, interactive teaching styles and also make maximum use of visual and kinaesthetic as well as auditory/verbal learning. The objectives that are used are taken from the school's skills and progression grid which is taken from the National curriculum, where possible lessons will involve a range of enquiry skills, and also practical activities.

The importance of delivering high quality practical work is recognised by STEM and was highlighted by This Science Community Representing Education (SCORE) report which examined the key findings of a review of practical work in primary, secondary and post-16 science education:

Section 2: Different types of Science enquiry lessons.

At St.Helen's children will have the opportunity to developing their skills, knowledge and understanding of Science phenomena through different types of Science lessons:

The five enquiry types

The National Curriculum for Science for England explains that,

"Working scientifically' specifies the understanding of the nature, processes and methods of science…"

This needs to be embedded within our teaching of the biology, chemistry and physics content. Through a variety of enquiry driven activities, children can work scientifically, working to answer scientific questions.

The National Curriculum for Science for England clearly lists 5 different types of enquiry that children should be familiar with across the primary school.

These are:

- Observation over time
- Pattern seeking
- Identifying, classifying and grouping
- Comparative and fair testing
- Research using secondary sources



Research using Secondary sources: Children at St. Helen's will be given the opportunity to develop their own independent and collaborative skills by using Secondary sources such as: websites, books, videos, and direct teaching to help them find out about different areas of Science.

Fair and comparative investigating: Children will have the opportunity to use practical Science lessons to develop their knowledge and understanding, using a familiar structure throughout the school. This will introduce the children to the importance of fair testing and knowing that a variable (what can be changed) may make a difference to the outcome of their test.

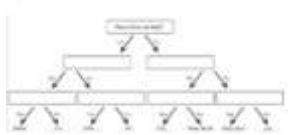
Identifying and Classifying: Children are given the opportunity to sort and classifying a range of if different items, materials, plants, animals or classifying living things using criteria. Children may use a key or diagrams to help identify and classify.

Pattern seeking: Children use different methods such as data, observation skills, measuring and recording to identify patterns to answer a question that has been set.

Observing over times: Children can find the answers to questions that have been set through observation over time. The period of time might be seconds, minutes, days or even months depending on the question asked.

In order to develop these key skills it is important that children have a range of different types of scientific lessons and have the opportunity to their enquiry skills. When developing a practical investigation it is important to develop and use consistent vocabulary when setting up an enquiry lesson.

Please note: These symbols are provided by ©Primary Science Teaching Trust 2019 **but may be freely used by teachers in schools for educational purposes, subject to the source being credited.**

Working Scientifically at St.Helen's: Enquiry Types: To be presented to children at the start of each lesson alongside the lesson objective.		
Observation over time. 	Pattern seeking  	Identifying, Classifying, Grouping.  
Fair and Comparative testing. 	Research using secondary sources. 	

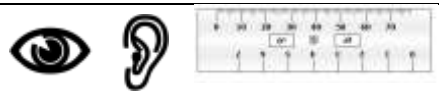
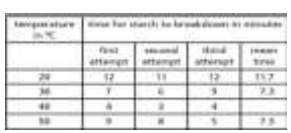
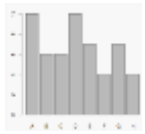
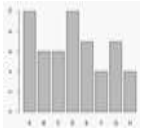
Section 3: Structure of practical Science Lessons.

In order for children to develop a clear progression in their Scientific skills and knowledge, a greater consistency and structure will be provided for children in practical enquiry lessons. Each practical investigation will follow a similar structure to ensure that children are building a better understanding. For younger children in Key Stage and for children will additional needs, this may involve the use of scaffolded investigations prompts (see appendix 1) but as children move into Key Stage 2, the structure should be familiar, in order for children to develop methodical, structured writing. (see appendix 2) Symbols have also been devised, as these will act as visual prompts and developed and used on IWB flipcharts (see appendix 3)

***Science Investigations: St.Helen's structure of Working scientifically and Symbols* to be used:**

KS1	KS2 Year 3 and 4	KS2 Year 5 and 6
Question: What do we want to find out? 	Question: What do we want to find out? 	Question: What is our question we want to set up an enquiry to investigate? 
Apparatus: What equipment will you need? 	Apparatus: What equipment will you need? 	Apparatus: What equipment will you need? 

Method: How will you carry out the test? 	Method: How will you carry out the investigation? 	Method: How will you carry out the investigation in detail? 
		Variables: What will you measure/ keep the same/ change to ensure a fair test? Comparative testing: 
Prediction: What do you think will happen? 	Prediction: What do you think will happen? 	Predictions: Explain with Scientific vocabulary- what do you think will happen? 
Observing: What did you see happen? 	Observing and Measuring: Make and record observations: What did you see happen? 	Observing and Measuring: Make and record accurate observations. What did you observe happen?

		
Results: Record simple results. 	Recording Results: Record your results in a graph, table or narration.   	Recording Results: Record your results in a table, graph, or narration.    A
Conclusion: What did you find out? Explain your findings. 	Conclusion: Explain your findings scientifically- what did you find out?  	Conclusion: Explain your findings scientifically- what did you find out? Was your prediction correct?   
		Evaluation: Reflect on whether the test was successful. What could have been improved? What could be tried next?

Section 4: Key Scientific vocabulary

In practical lessons key vocabulary will be used, so that all children at St. Helen's begin to develop a clear understanding and consistency in key scientific vocabulary. Using the structure of a practical lesson will enable this vocabulary to be used more frequently.

Key 'Working Scientifically' vocabulary that we want our children to learn include:

EYFS	KS1 Year 1 and 2	Year 3 and 4	Year 5 and 6
Equipment Results Sort Explore Observe Similar	Question Answers Results observations explore identification, comparison notice . equipment measurements, tests pattern seeking similar	prior knowledge questions. evidence secondary sources enquiry. Investigate systematic and careful observations. Range of equipment **comparative and simple fair tests**	scientific questions. enquiry. Gathering evidence Comparative and fair testing Fair tests, Variables. observation gathering accurate data record and present evidence. conclusions, accuracy of measurements predictions
Explanatory noteA **comparative test** is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This leads to a ranked outcome. A **fair test** is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.			

Section 5: Implementation Science Curriculum Overview taken from Global Curriculum Long Term Plans

	Term1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 6	Scientific Enquiry Skills and content: Light	Scientific Enquiry Skills and content: Animals including Humans	Scientific Enquiry Skills and content: Evolution and Inheritance	Scientific Enquiry Skills and content: Electricity	Scientific Enquiry Skills and content: Living Things and Habitats	Scientific Enquiry Skills and content: Living Things and Habitats
Year 5	Forces	Forces	Living things and their habitats	Properties and changes of materials	Earth and space	Animals, including humans
Year 4	States of matter	States of matter	Sound	Electricity	Living things and their habitats	Animals inc humans
Year 3 **Cycle A**	Health and humans	Forces	Rocks	Animals	Light	Plants
Year 3 **Cycle B**	Light	Forces and Magnet	Animals- including Humans	Health and humans	Rocks	Plants
Year 2	T1 and T2: Living things and habitats		T3 and T4: Animals including humans		Materials Use of Everyday materials	Plants

Year 1	Seasons – autumn	Seasons – winter Curriculum link – living things and their habitats (not y1 objective)	Animals including humans	Seasons - spring	Seasons - summer Everyday Materials	Plants
EYFS	**ELG's 'Understanding the world.'** •Explore the natural world around them, making observations and drawing pictures of animals and plants. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.					

Section 6: Planning practical Science lessons- recommended websites:

In line with our Connected Curriculum, below is our Science overview. Alongside the topics, which will be planned for by using specific objects from the National curriculum, are recommended enquiry questions that could be covered. These have been taken from recommended Scientific websites and we would like to acknowledge the use of these resources.

Manchester Univeristy https://seerih-innovations.org/enquiringscience4all/downloads/ Progression maps.

EnquiringScience4All https://seerih-innovations.org/enquiringscience4all/ Enquiry lessons

PSTT Primary Science Teaching Trust https://pstt.org.uk/resources/curriculum-materials/enquiry-skills

Assessment and Exemplifications of work: https://www.planassessment.com/copy-of-plan-knowledge-matrices-tea

Year Group	Autumn A	Autumn B	Spring A	Spring B	Summer A	Summer B
1	Everyday materials	Seasonal changes (Autumn and Winter)	Animals including humans	Seasonal changes (Spring and Summer)	Plants	Seasonal Changes (Summer) Scientists and Inventors
Opportunities for working Scientifically: Child led enquiry opportunities	How can we sort these items? Which materials are attracted to a magnet?	What happens to trees in each season? Which trees grow in our local areas?	Which parts of my body are involved in my senses?	How do habitats change over the seasons?	What is the plant's name? Can you sort the parts of a plant into the correct groups?	

(Can write as questions?) Enquiry Type Fair & comparative testing Research using secondary sources Identifying, classifying & grouping Pattern seeking Observing over time	Which material would make the best umbrella? Which material would make the best chair?		Which sense do I use to....? What do I use my ..... for? Just because I am older am I taller?			

During years 1 and 2 pupils 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						
2	Use of Everyday Materials	Use of Everyday Materials	Animals Including Humans Spring	Living things and their habitats.	Plants	Plants
Child led enquiry opportunities (Can write as questions? Enquiry Type Fair & comparative testing Research using secondary sources Identifying, classifying & grouping Pattern seeking	What would be the best material to build a castle from? Which materials have been used to build our school?	How can you change the shape of these materials? What materials can you bend and twist? How can we group materials by the changes that can be made to them?	Which foods are healthy/unhealthy? which drinks are unhealthy for our teeth? Why are some foods unhealthy? How do I keep healthy?		How long does it take for a seed to grow to grow? What conditions are needed for a plant to grow?	

Observing over time						
During years 1 and 2 pupils 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						
3	Light	Forces and Magnets	Animals including Humans: Nutrition	Animals including Humans: Skeleton	Rocks	Plants- function of plants.
Child led enquiry opportunities (Can write as questions? Enquiry Type	Which is the best material for a mirror? Which material is best for sunglasses? Do cats' eyes light up in the dark? - lead on to luminous and non luminous objects?	How do different surfaces affect the distance a car travels? Do magnets need to touch for them to work?	what would happen if I only ate...? Why do I need... to be healthy?	what would happen if I didn't have ... skeleton, any muscles?	Classifying rocks based on their physical properties What is a fossil and how is it formed? What is soil made from?	What do the different parts of a plant do? What is needed for a plant to grow? How does water get from the roots to the leaves?

Fair & comparative testing Research using secondary sources Identifying, classifying & grouping Pattern seeking Observing over time	Why can we see fireworks better in the dark? How do the size of a shadow change over a day?				Which soil drains fastest?	Why do plants have flowers? How does a plant disperse seeds?

During years 3 and 4, pupils 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 • finding						
4	Sound	Electricity	States of Matter Solid Liquids Gases	States of Matter Water cycle	Living things and their habitats	Animals and Humans: Teeth Digestive systems
Fair & comparative testing Research using secondary sources Identifying, classifying & grouping	1. Cup & string - pupils to ask their own enquiry question. Can you make a guitar that plays 4 different pitch sounds? What is the effect of distance from source on the		Can you sort these materials into solids, liquids and gases? What is the boiling point of different liquids? What is the melting point of different materials?	Where is the best place to dry washing? How does temperature affect the speed an ice cube melts? does ice change as it is heated to 100 degrees?	How can we group plants based on their features? Can you use a key to identify a plant	Why do we have different teeth? Can you guess this animals diet from its teeth? What happens to our food? Which part of the digestive system does the most important job.

Pattern seeking Observing over time	volume/amplitude of a sound?		Which place is the best place to dry the washing?	Does everything boil at 100 degrees?		[organ job interview]

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- 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.

5	Living things and their Habitat: Life cycles	Animal including Humans. Changes	Properties and Changes in Materials	Properties and Changes in Materials	Earth and Space	Forces
Child led enquiry opportunities (Can write as questions?) Enquiry Type Fair & comparative testing Research using secondary sources Identifying, classifying & grouping Pattern seeking Observing over time	What stages are there in the life cycles of plants? What happens during pollination? Do all flowering plants disperse their seeds in the same way?	How does the body change as we grow older? Why does the body change? Is it good or bad? What changes do you think will happen to you in the future?	Which material is the best thermal insulator? How can we separate these mixtures? Which material is the most soluble? How can we make the sugar dissolve faster? Which material would make the best flask? How can we make the water clean?	How much sugar can be dissolved in a cup of water? (How sweet can you make your tea?) What material is best for making a coat? Which of the following experiments (give some reversible and some irreversible) can be reversed? How can you get the salt back from the water?	How do the planets in the solar system differ?	● How does the size if an object affect the rate it falls at? What size wing makes the best paper sycamore helicopter? What is the best material to make a parachute out of? Does the length of a lever effect the size of a force produced (making a shaduf/trabuchte)? Where do you find gears in the real world?

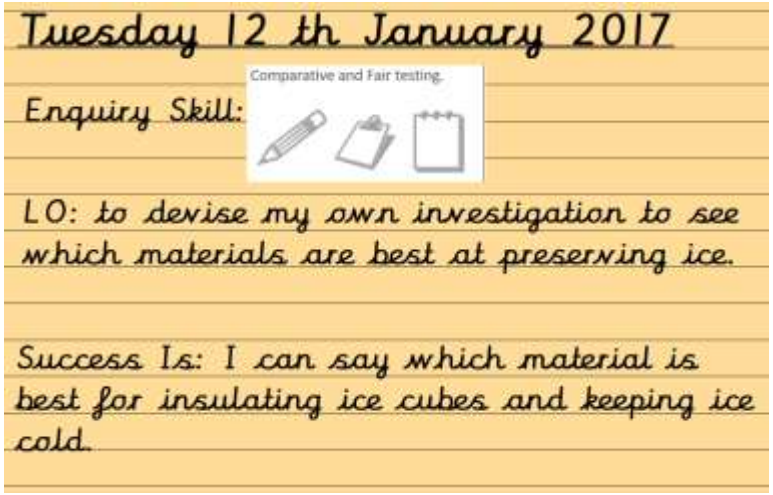
				What amount of vinegar/ bicarbonate of soda best inflates		
Statutory requirements During years 5 and 6, pupils should be taught to use the following practical scientificmethods, processes and skills through the teaching of the programme of study content: • planning different types of scientific enquiries 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 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.						
6	Electricity and Circuits	Light	Evolution and Inheritance	Evolution and Inheritance	Living things and their Habitat: Classification	Animals including Humans Healthy Living
Child led enquiry opportunities	Does the length of a circuit effect the	How can a submarine see			How can plants be sorted into groups based on their features?	How does exercise affect our heart rate? This leads

(Can write as questions? Enquiry Type Fair & comparative testing Research using secondary sources Identifying, classifying & grouping Pattern seeking Observing over time	brightness of a bulb? How many batteries are needed to adjust the brightness of bulb?	where it is going? Why do we see the moon? 3. What is the best position for a car rear-view mirror? 4. How can I use shadows to identify aeroplanes? 4. How does the position of a light source affect the size of a shadow?				to... Does your heart rate go up forever? Is it the same for adults and children? Does your height or weight affect how your heart rate goes up?
Statutory requirements During years 5 and 6, pupils should be taught to use the following practical scientificmethods, 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						

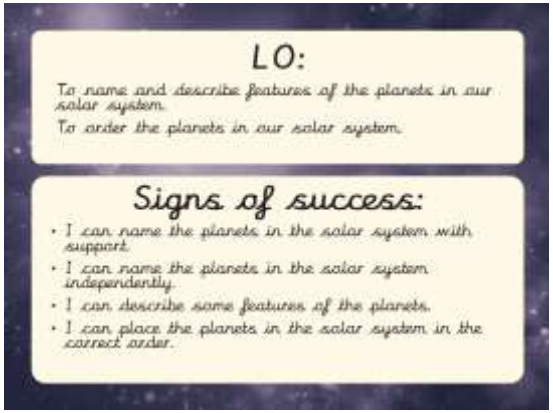
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- 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 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.

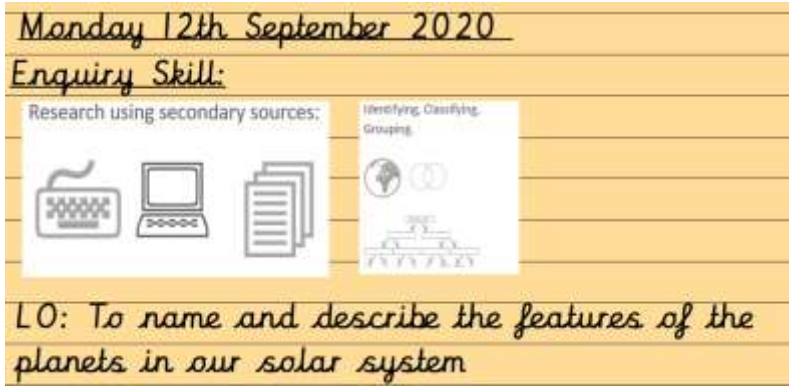
Section 6: Appendix

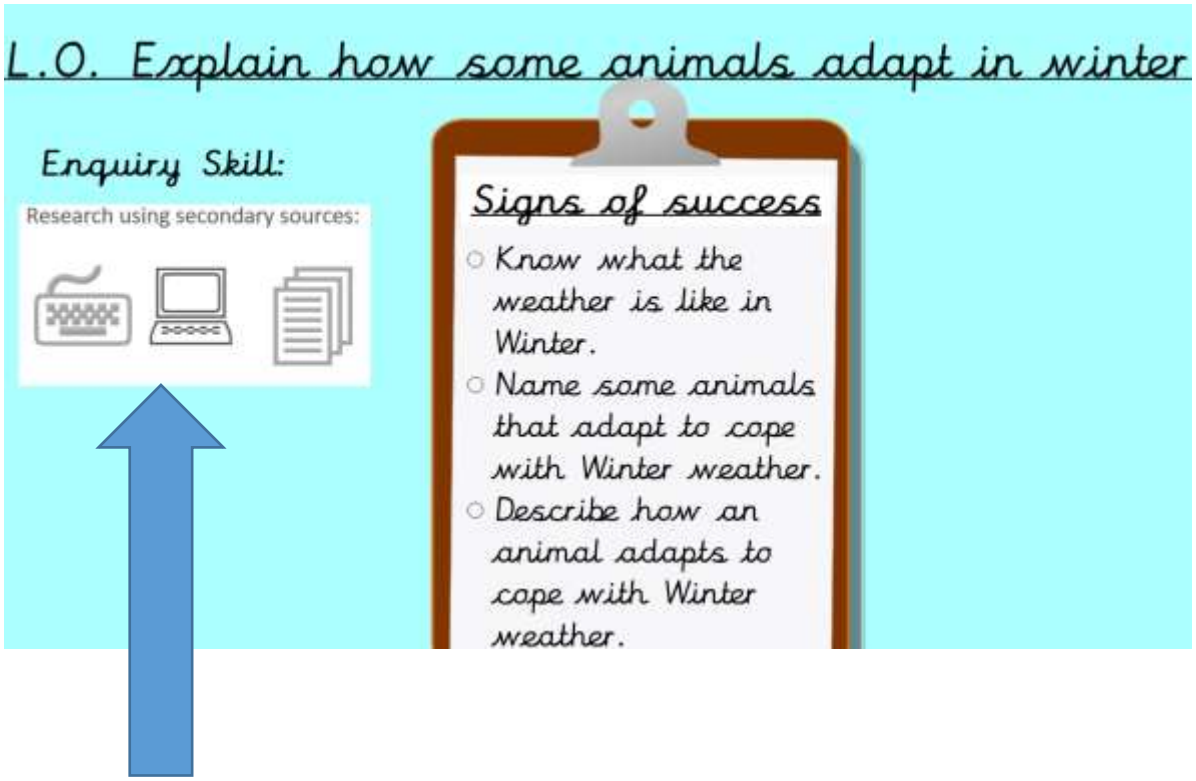
Flipcharts to be displaying the Science enquiry skills being covered:



If flipcharts are being used from published schemes, they must show the enquiry skill being used by the children.







Identification of the Science enquiry skill that is to be used.

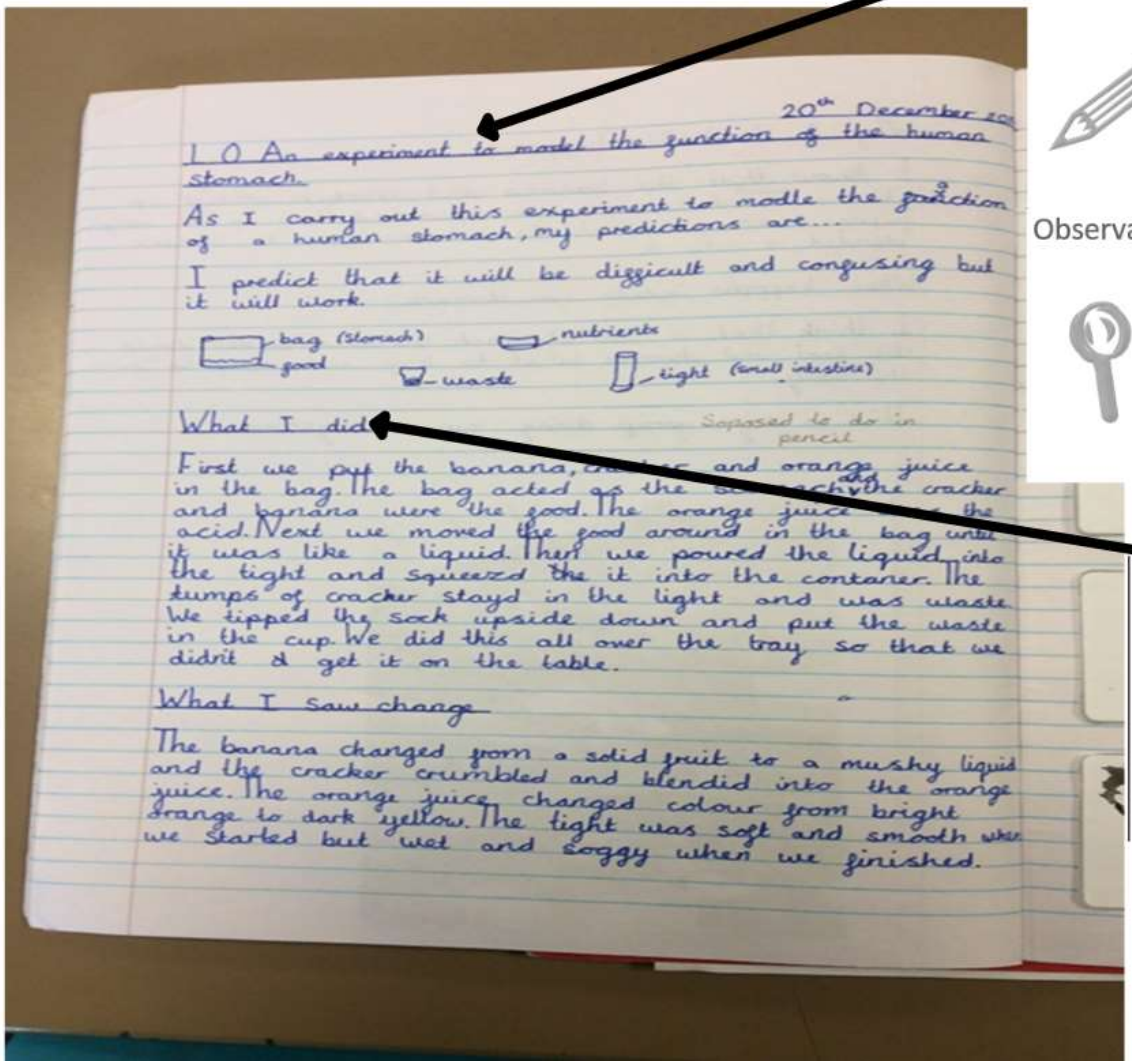
Year 3 and 4

Put the enquiry skill:

Comparative and Fair testing.

Observation over time.

Method: How will you carry out the investigation?



20th December

I O An experiment to model the function of the human stomach.

As I carry out this experiment to modle the function of a human stomach, my predictions are...

I predict that it will be diggicult and confusing but it will work.

bag (Stomach)
food
nutrients
waste
light (small intestine)

What I did

Supposed to do in pencil

First we put the banana, [illegible] and orange juice in the bag. The bag acted as the [illegible] the cracker and banana were the food. The orange juice [illegible] the acid. Next we moved the food around in the bag until it was like a liquid. Then we powed the liquid into the tight and squeezd the it into the container. The lumps of cracker stayd in the light and was waste We tipped the sock upside down and put the waste in the cup. We did this all over the tray so that we didnt d get it on the table.

What I saw change

The banana changed from a solid fruit to a mushy liquid and the cracker crumbled and blendid into the orange juice. The orange juice changed colour from bright orange to dark yellow. The tight was soft and smooth when we started but wet and soggy when we finished.