Science at

St. Andrew's

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What Science Looks Like At St. Andrew's

1. Timetable:

Science is taught weekly as one lesson.

2. Content of Science lessons:

Starter: Each lesson should start with a Quick 6 activity to recap on previous learning only in your year group. Some children may finish so a seventh open-ended question can be used to encourage deeper thinking. Activities such as 'odd one out' give children opportunities to justify opinions and explain reasoning. Next steps can also be done at this point. Go through answers with the class. Children mark in pink pen.

Main Activity: Lessons should begin with a question as a learning intention. Children are then given opportunities to answer that question through a range of differentiated activities which may involve research, drawing diagrams, collecting data, collaborative learning or completing an investigation. Objectives for lessons and activities must be taken from the National Curriculum and its Programme of Study. Lessons can link to other areas of the curriculum but should not be forced. Consider all factors when declaring a topic in a certain time of year e.g more outdoor learning in warmer seasons e.g light and shadow topics and avoid plant topics in winter.

Investigations: Children must always carry out an investigation using the St Andrew's investigation sheet. The headings can be written in to the child's book but the format must be the same throughout school e.g we say 'prediction' not 'hypotheses'. In Year 3 and 4 children will be encouraged to use the language written on the sheet in green. In Year 5 and 6, children will be expected to regularly use the purple writing on the investigation sheet in the green writing's place and use words like 'variable' and 'constant' to explain their understanding, not "This is the 'thing' I am going to change.". Depending on the activity, some sections may already be filled out by the teacher before the lesson so as to not waste learning time e.g 'equipment used' or 'how to carry out the investigation' / 'method'. Children should always be given opportunities to make a prediction, record their own results (although a template may already be given) as a graph chart or table and write about what they have found out (conclusion and evaluation). Children should aim to use a 'the, the' sentence to explain their thinking.

Investigations may not necessarily fit in to a topic organically. As the year goes on, investigations should be carried out so that all scientific enquiry objectives are covered across the topics taught.

Scientists: Children should learn about a scientist famous for the particular type of science the children are studying. This can be done in a lesson or set as a homework or project style home learning. For example, when learning about animals children could learn about Jane Goodall or when learning about classification, children could learn about Carl Linnaeus.

Spelling and vocabulary: In the Science National Curriculum Programme of Study, the correct use of and spelling of key vocabulary is emphasised across the key stage and is an important part of ongoing learning. Key vocabulary should be displayed for every unit of work and referred to

regularly. Challenge incorrect spelling of key words. Children should be using key vocabulary in context in their explanations e.g magnets do not 'stick' together, they 'attract', or, water is not 'sucked up' by the roots, the water is 'absorbed'.

Assessment: Each teacher will use a bespoke test they create from Testbase to assess children's understanding at the end of a topic. This will be stuck in to books. In addition, at the back of the book, each child will have a progression of skills sheet. Once a skill has been taught within a topic the teacher will highlight that skill red, yellow or green based on the child's understanding. These two elements (along with the ongoing learning and verbal and written understanding from lessons) will inform the teacher where the child is in their science education. Assessments are put on Target Tracker every term.

Science at St Andrew's Intent, Implementation and Impact

Intent

Our Science topics are informed through the National Curriculum. We use the Rainbow Continuum to ensure that children are taught scientific skills and that those skills progress as they move up through school.

High quality lessons help children to aspire to be the best they can be. Following on from Key Stage 1, teachers will instill, extend and enhance a love of learning in children where they can explore science with a continued confidence. Where possible, we link Science learning to other subjects to allow children to be fully immersed in their learning.

Through our teaching of Science at St Andrew's, we intend to:

- give children the opportunities to see how skills and knowledge can be applied in the real world.
- Show children how to use skills in future endeavours and become well-rounded members of society.
- broaden and develop scientific learning in order to deepen understanding.

Through science lessons, we can also:

- improve pupils' skills in literacy (correct spelling of key vocabulary), numeracy (data handling) and ICT (collecting data e.g data loggers).
- develop pupils' scientific thinking skills e.g making predictions and altering thought processes when repeating tests.
- promote pupils' awareness and understanding of gender, cultural, spiritual and moral issues e.g looking after animal habitats in the local environment.

Implementation

The Science lead checks the long term plans to ensure coverage of the National Curriculum content and the historical skills set out in the Rainbow Continuum. Science is taught as a discrete subject, weekly. Every year group teaches Science every half term and the final half term is used for consolidation. This gives the class teacher an opportunity to plan for any misconceptions raised earlier in the year and challenge tasks. The timing of the lessons have been carefully chosen so that children can create links to other subjects and build on relevant prior learning through a spiral curriculum.

To create the interesting and engaging lessons, we use a variety of resources. Memorable experiences such as trips or in-school visitors create excitement and interest in children. Investigations are undertaken so that children can independently discover an answer to a given challenge. Children are able to undertake their own line of enquiry through evaluating learning. Home learning projects (such as during Science week) also add to the immersion and interest and allow parents and carers to be involved with their learning and foster home-school links in subjects other than reading.

We have representatives which attend the Science network meetings. We also work with Copley Junior School as part of the Ogden Trust Partnership program. This then leads to high quality planning and teaching of the subject.

Lessons are planned to allow all children to access the science curriculum. The document 'What Greater Depth Looks Like at St Andrew's' allows teachers to plan lessons that will challenge the most able. SEND pupils are supported through differentiated learning activities. This may include differentiating through outcome, support or through simplifying the learning objective. Children do not always have to demonstrate learning through writing to ensure we can assess their scientific skills. Opportunities are given where children can draw diagrams or give verbal explanations which show understanding.

In order to help children retain key information, we use 'Quick 6' questions at the start of most lessons. These six questions revisit key facts and important information. Regular recall of such facts helps children commit them to their long-term memory, ensuring they will retain the 'sticky knowledge' for the end of Key Stage 2.

Science 'Sticky Knowledge' – what children need to know by the end of Key Stage 2

WORKING SCIENTIFICALLY

- The way to carry out a scientific investigation following our proforma in school.
- Examples of famous scientists and what they did in their chosen scientific field.

BIOLOGY

- Know a variety of living things and how to look after those things through an understanding what is in living things' bodies (animals and humans).
- Features of plants and how to look after them.

PHYSICS

- How natural phenomena like electricity, magnetism, light, sound and gravity are created and give examples of how we can harness and use this.
- Features of the solar system and night sky.

CHEMISTRY

- Identify some types of rocks and know how soil and fossils are made.
- Where we see changes of state (including reversible and irreversible changes) and examples of this.

Assessment is ongoing throughout each science topic. Children start new topics by discussing or mind-mapping what they already know and what they want to find out as a pre-assessment activity. AfL is used regularly in lessons and misconceptions quickly clarified. Summative assessment takes different forms but may include a knowledge based test or a written activity where children demonstrate their learning.

Impact

Each child's individual science book and the whole class 'Big Books' show that science is taught regularly and learning recorded in a variety of ways. Where possible, this includes outdoor learning. Outcomes of work are monitored to ensure that they have a clear understanding of key knowledge. Teachers can then clarify misconceptions where appropriate and revisit areas of learning if necessary.

Emphasis is placed on children being able to demonstrate curiosity, enquiry and scientific vocabulary. They build on prior learning in order to further their knowledge and understanding. This helps them to see how science influences all lifestyles and how it shapes our world today.

By nurturing a love of science and an interest in the world, the children will be encouraged to research topics independently and conduct their own investigations to further their own enjoyment and curiosity on the subject.

The outcomes of pupils will be monitored by the class teacher, subject lead and SLT through assessment and marking, tracking, book scrutiny and pupil interviews.

Science Policy

1 Aims and objectives

1.1 Science teaches an understanding of the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity. Pupils need to be taught essential aspects of the knowledge, methods, processes and uses of science and encouraged to develop a sense of excitement and curiosity about natural phenomena**.**

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1.2 **The aims of science are to enable children to:**

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

2 Teaching and learning style

2.1 The school uses a variety of teaching and learning styles in science lessons. Our principal aim is to develop children's knowledge, skills, and understanding in science. We do this through a topic based curriculum which includes whole class teaching, group and paired work and individual investigative work. During these sessions we expect children to ask and answer scientific questions, engage in enquiry based research activities where they can progress their skills, use technical terminology accurately and build up extended specialist vocabulary.

2.2 We recognise that there are children of widely different scientific abilities in all classes and we ensure that we provide suitable learning opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this in a variety of ways by:

setting common tasks which are open-ended and can have a variety of responses e.g Explorify odd one out tasks;
setting tasks of increasing difficulty;
setting differentiated tasks for each ability group;
providing resources of different complexity, matched to the ability of the child;
using classroom assistants to support the work of individual children or groups of children.
using display boards to help promote challenge and higher order thinking and as a means of recording children's ongoing understanding and thought processes.

3 Science curriculum planning

3.1 The school uses the National Curriculum 2014 as the basis for implementing the statutory requirements of the programmes of study for science. This has been incorporated into topic areas

wherever possible (but not always) which include science, history, geography, art and design technology. The local environment is used wherever possible in our fieldwork. Visits/trips to venues which aid and develop children's learning are also used.

3.2 We carry out our curriculum planning in science in three phases (long-term, medium-term and short-term). The National Curriculum details what we teach in the long term. We also use the Rainbow continuum to ensure skills progression across year groups.

3.3 Our medium-term plans, which we also base on the National Curriculum, give details of the main teaching objectives for each term. In some cases this is around a science based topic and in others as a discrete subject alongside history or geography. Medium term plans are kept on the school server. These plans outline the lesson objective in the form of a question, outline the main teaching involved, tasks the children undertake, further challenges and a plenary.

3.4 Class teachers may complete a weekly plan for the teaching of science. This lists the specific learning objectives for each lesson and gives details of how the lessons are to be taught. The class teacher keeps these individual plans.

4 The contribution of science to teaching in other curriculum areas

4.1 Science is taught as part of a topic based curriculum. Children should apply their mathematical knowledge to their understanding of science including collecting, presenting and analysing data.

Science incorporates the skills areas of:

- Communication – The ability to explain their observations and results;
- ICT – to analyse, interpret, evaluate and present information for a variety of purposes;
- Working with others – to develop social skills to contribute to small group and whole class discussions and consider the work and ideas of others;
- Improving performance – by evaluating their own work;
- Problem solving – by developing skills and strategies to enable them to design and carry out science investigations;
- Information processing – locate, sort, classify, sequence, compare and contrast;
- Reasoning – make predictions, judgements and decisions;
- Enquiry – ask relevant questions, plan and predict outcomes;
- Creative thinking – to extend ideas and look for alternative solutions;
- Evaluation – to judge their own and others work and draw conclusions.

4.2 Spiritual, moral, social and cultural development.

Science lessons can provide a contribution to pupils' SMSC by

- Critical thinking – skills of analysis, evaluation and reflection of the world around them;
- Problem- solving approach to investigation work;
- Participation in paired and group work;
- The use of science in real life settings;
- The wonder of science developments in our ever-changing world.

5 Teaching science to children with special needs

5.1 We teach science to all children, whatever their ability. Science forms part of the school curriculum policy to provide a broad and balanced education for all children. We provide learning opportunities that are matched to the needs of children with learning difficulties. Our work in science takes into account the targets set in the children's Personal Provision Plans (P.P.P's).

6 Assessment and recording

Short term - We assess children's work in science by making informal judgements as we observe them during lessons and in the work produced in books in the lesson. On completion of a piece of work, the teacher marks the work and comments as necessary. A 'next step' challenge may also be used to help develop their learning. Misconceptions are addressed in the next lesson and a 'Quick 6' activity is also used to help retain knowedge.

Medium term – At the end of a unit of work a judgement is made as to whether a child has met the learning objectives for that unit by using a bespoke Testbase assessment sheet. These are glued in to the children's books. A RAG sheet is filled in just for skills objectives taught in the topic which shows whether or not the child has achieved that objective. Progress data is recorded on Target Tracker.

Long term – Teachers make a judgement towards the end of the year using the RAG grid in each child's book and data on Target Tracker as whether or not the child is performing below expectations, at the expected level or above it. Teachers are able to make a summary of each child's progress and discuss this with parents and the teacher for the following year.

7 Resources

7.1 We have sufficient resources for all science teaching units in the school which is kept in a central store. The stock of resources is monitored by the Science coordinator and replenished as necessary using the Science budget. The library contains a variety of science books and Chromebooks are available to support children's individual research using websites verified by the class teacher before the lesson.

8 Monitoring and review

8.1 The science subject leader is responsible for supporting colleagues in the teaching of science, for being informed about current developments in the subject and for providing a strategic lead and direction for the subject in the school. The Science lead is required to lead staff meetings where appropriate and cascade information to staff. At agreed times within the year the science coordinator along with the head or deputy will conduct a learning walk. Book scrutinies will also be undertaken by the science coordinator and the Head teacher and Deputy. The science subject leader liaises with the head teacher and deputy where science is evaluated with strengths identified in the subject and indicators for further improvement will be discussed.

Science - Long Term Overview 2019-20

RSE OBJECTIVES - In Science, children build on their knowledge of life cycles and learn about the basic biology of human reproduction, including the birth of a baby in Years 5 & 6. Children are taught about the physical, emotional and social changes at puberty, which include the importance of personal hygiene how to keep our bodies safe.

Long Term Overview

	Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Y3	***Rocks*** Identifying how rocks are made, identify and sort types of rocks.	***Forces and magnets*** Investigate magnetic properties of materials and situations on whether a magnet will attract or repel.	***Animals including humans*** Skeletal system, diet and nutrition RSE OBJ - Body hygiene RSE OBJ - Keeping our bodies safe.	***Plants*** How to keep healthy plants, name parts of a plant.	***Light and shadow*** Investigate shadow length and reflective surfaces.	Consolidation
Y4	***Animals and their habitats*** Group animals, environmental issues.	***Humans and living things*** Teeth, food chains and the digestive system.	***Electricity*** Make a simple circuit, Identify mains and battery powered items and conductors and insulators.	***States of Matter*** Solids, liquids and gases and the water cycle.	***Sound*** How to change volume and pitch, how sounds are made and how we hear sounds.	Consolidation
Y5	***Properties and changes of materials.*** Investigate how materials mix and are separated. Investigate properties of materials.	***Earth and Space*** Explore the movements of the Earth, Sun and Moon and planets. Explain day and night.	***Forces*** Explain and investigate different types of forces.	***Human development Gestation periods in animals and humans*** Describe changes of humans as they grow. RSE OBJ - How a baby is made and how it grows. RSE OBJ- Birth of a baby.	***Plant reproduction/Life cycles*** Investigate life cycles and reproduction in plants and animals	***Cams, pulleys and levers*** Explain how pulleys and levers use forces.
Y6	***Circulatory system*** Explain the functions of the parts of the system and how exercise and drugs affect the body. RSE OBJ - Habits (including drug, alcohol and tobacco education), legal and illegal substances	***Electricity*** Investigate how using components differently can affect a circuit. Draw symbols.	***Animals including humans.*** Adaptations, classifications and micro-organisms.	***Evolution*** Investigate how living things change over time. Investigate how living things adapt.	***Light*** Explore that light travels in straight lines. How do we see things.	Consolidation

WHAT DOES GREATER DEPTH LOOK LIKE AT ST ANDREW'S?

SCIENCE

In terms of planning for greater depth, the question we need to ask ourselves is how do we extend children's learning when they have mastered the basic curriculum concepts?

Allie Beaumont, a Babcock assosciate says, "Greater depth doesn't officially exist in Science but challenging deeper thinking is good learning and secures better understanding."

Rachel Rayner, a teaching and learning adviser for primary mathematics at Herts for Learning says, "Children who consistently work at greater depth are confidently able to deal with increases in the complexity of how a subject is presented."

In this document, there will be a selection of criteria presented that staff need to aim to provide for children during Science lessons. This will assist them in getting to greater depth or show that they are performing at greater depth. There is also a selection of examples of work taken from the books of children at St Andrew's, which staff have declared as 'Greater Depth'. These examples will help staff to plan opportunities to develop deeper thinking for greater depth children more accurately in the future.

The following is a selection of ideas taken from Owen Phillips (DHT Woodhill Primary) who outlines the ways you can 'go deeper' when aiming for greater depth. Is the child you are considering to be at greater depth able to show they can do these things?

- Work independently
- Evaluate conclusions when working scientifically and explore a concept with a greater degree of independence
- Apply what they've learned in one area of a subject to other areas
- Children can answer 'what if?' questions with insightful and thoughtful ideas where they make links between prior and current learning in a familiar relatable context and justify why they think this with accuracy.
- Apply their knowledge consistently, confidently and fluently.
- Be able to explain what they have been doing to others, including teaching other children what they have learned.
- Independently use and apply correctly spelled vocabulary accurately in context to predict or explain scientific ideas conclusions or evaluations.
- Children form a relationship with their learning. It has human significance so it's relevant to the future decisions and the active contribution children can make to the world;

- ***REMEMBER, Greater depth is NOT about remembering facts – greater depth is about encouraging deeper thinking, testing hypotheses and predictions.***

THINGS TO CONSIDER WHEN TEACHING WITH GREATER DEPTH IN MIND.

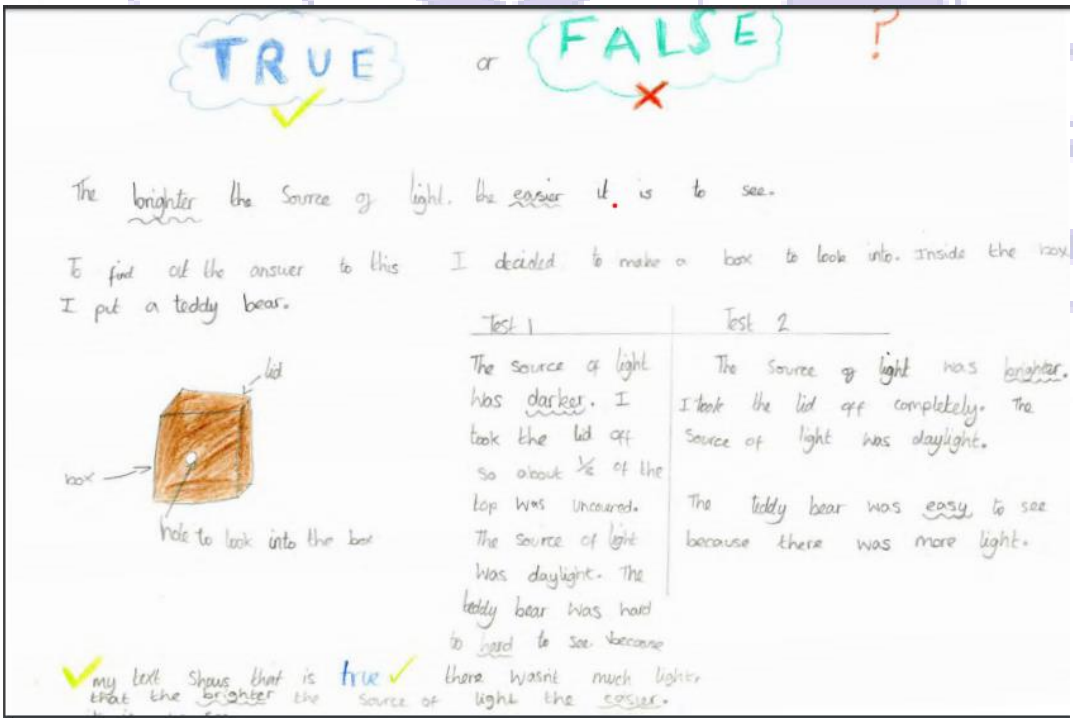
-Teach to the top and have high expectations for all children. Often, teachers will present a concept to the whole class then drip in more complex ideas, questions and tasks as and when they see children being successful. As was seen in Teaching Backwards, Chapter 1, setting high expectations, if you settle for a 'that will do' attitude for the learners they will not achieve as well. Setting high expectations from the outset challenges pupils to think 'is this my best work?'

-Teach children how to reflect, explain, justify and question are key to lesson design. Children must be able to explain how they know they are right. They may need guiding to get there with careful questioning. But they must always be using a correct scientific vocabulary.

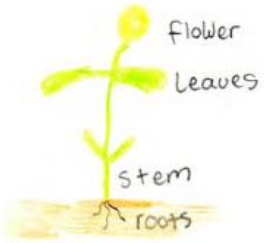
- Learning must be slowed down and focus much less on coverage. "You've got that fact, now here is a new fact." No, children should be encouraged to apply learning in different ways around a similar topic. Where do we see this in the real world? Who do you know uses this type of science? And so on.

- Have opportunities to collaborate. When children are in groups they have opportunities to generate endless lines of enquiry. They are able to question each other effectively and challenge ideas.

-Plan to give children an opportunity to show their learning in a variety of ways. Chris Quigley, from his document 'Greater Depth in Science: Planning For Fundemental Foundations to Greater Depth' says that to plan for progress, different types of tasks may be created that prove to the teacher that pupils are gaining a deeper understanding of the same content. Here are some examples.



Are roots always at the bottom of plants?



Roots are always at the bottom of plants. This is because the roots have two jobs.

1) to anchor the plant.
2) to soak water.

To do the jobs well the roots go into the soil which is at the bottom.

My Animal Guide

Birds

To spot birds you need to look up in the sky or in the trees. Birds have feet, feathers wings and beaks. If you listen you can hear songbirds especially in the morning. They eat insects and worms.

Fish

You will find fish in rivers, lakes, ponds and the sea. Fish have gills instead of lungs. Instead of legs or wings fish have fins. Some fish are very small and some are big.

Amphibians

Amphibians live on water and on land. Young amphibians are like fish with gills and adults are like reptiles with lungs. Frogs are amphibians and so are newts.

Reptiles

Snakes and lizards are reptiles. They lay eggs. All reptiles have scales.

Mammals

Humans are mammals. They feed their young from milk from their Mothers. Many animals are mammals like dogs, cats, mice, hamsters, cows, horses and sheep.

Invertibrates

Invertibrates have no backbone. Some examples are spiders, insects, crabs. They have an exoskeleton which means it has a hard shell.

Sparrowhawks

If the population of sparrowhawks increase then:

1. There will be fewer song birds because sparrowhawks eat songbirds, such as the nightengale.
2. There will be more insects, snails and slugs in gardens because there won't be enough songbirds to eat them.

3. Garden vegetables and plants might be eaten by the insects causing a problem for gardeners.

Climate Change

I have been researching climate change by using www.climatechange.nasa.gov. Here are some of the things I have found out:

1: What is the problem? The Earth is getting warmer and this is causing some very fast changes, even though the temperature rise is low. Ice is melting and sea levels are rising

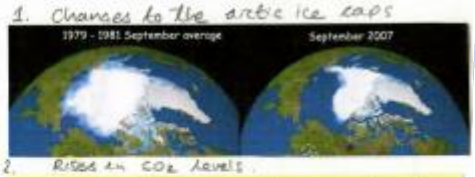
2: What is causing the problem? Scientists have evidence that Carbon Dioxide (CO_2) is causing the rise. It comes from burning fossil fuels like coal, oil and gas.

3: What are the effects?

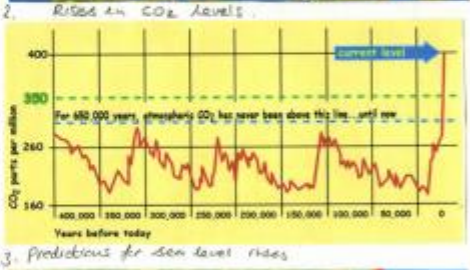
- Melting ice caps at the Arctic
- Rising sea levels
- Droughts and wildfires

The Evidence

1. Changes to the arctic ice caps



2. Rises in CO_2 levels

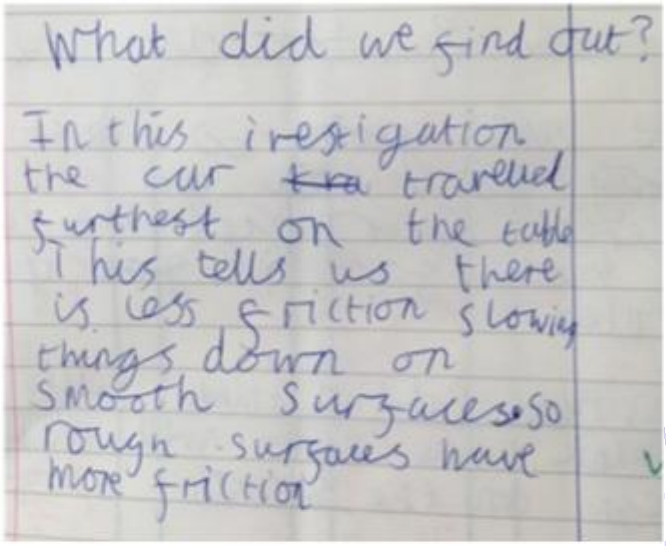


3. Predictions for sea level rises

The following examples are from children who staff at St Andrew's have declared as 'greater depth'. A comment has been added to each example to give insight as to why it could be considered greater depth work.

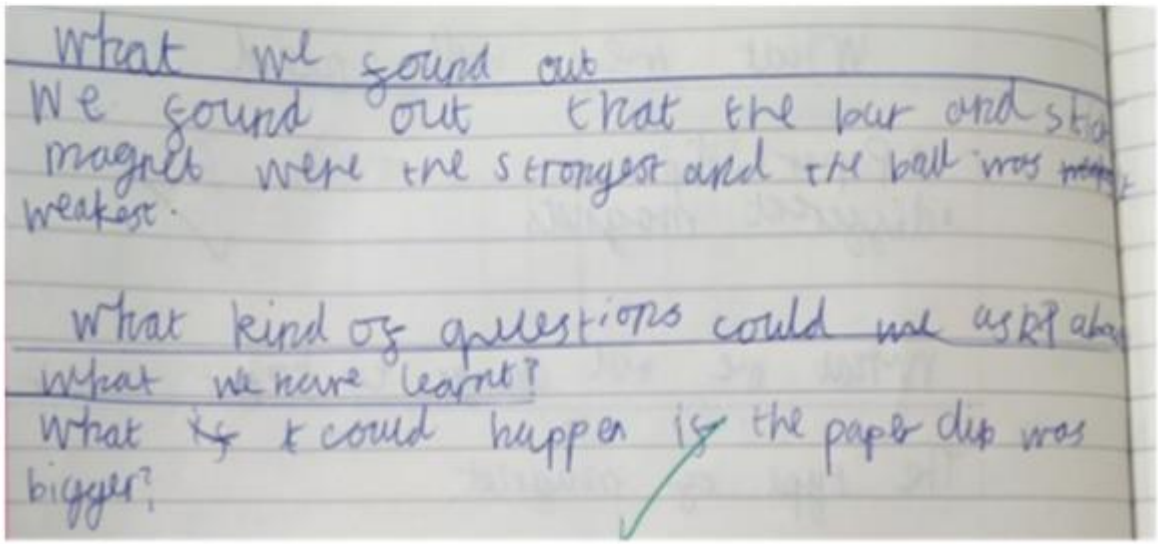
Year 3

Children apply what they have learned in to their explanations. They ask questions which could be asked in future investigations.



What did we find out?

In this investigation the car ~~was~~ travelled furthest on the taffle This tells us there is less friction slowing things down on smooth surfaces so rough surfaces have more friction



What we found out

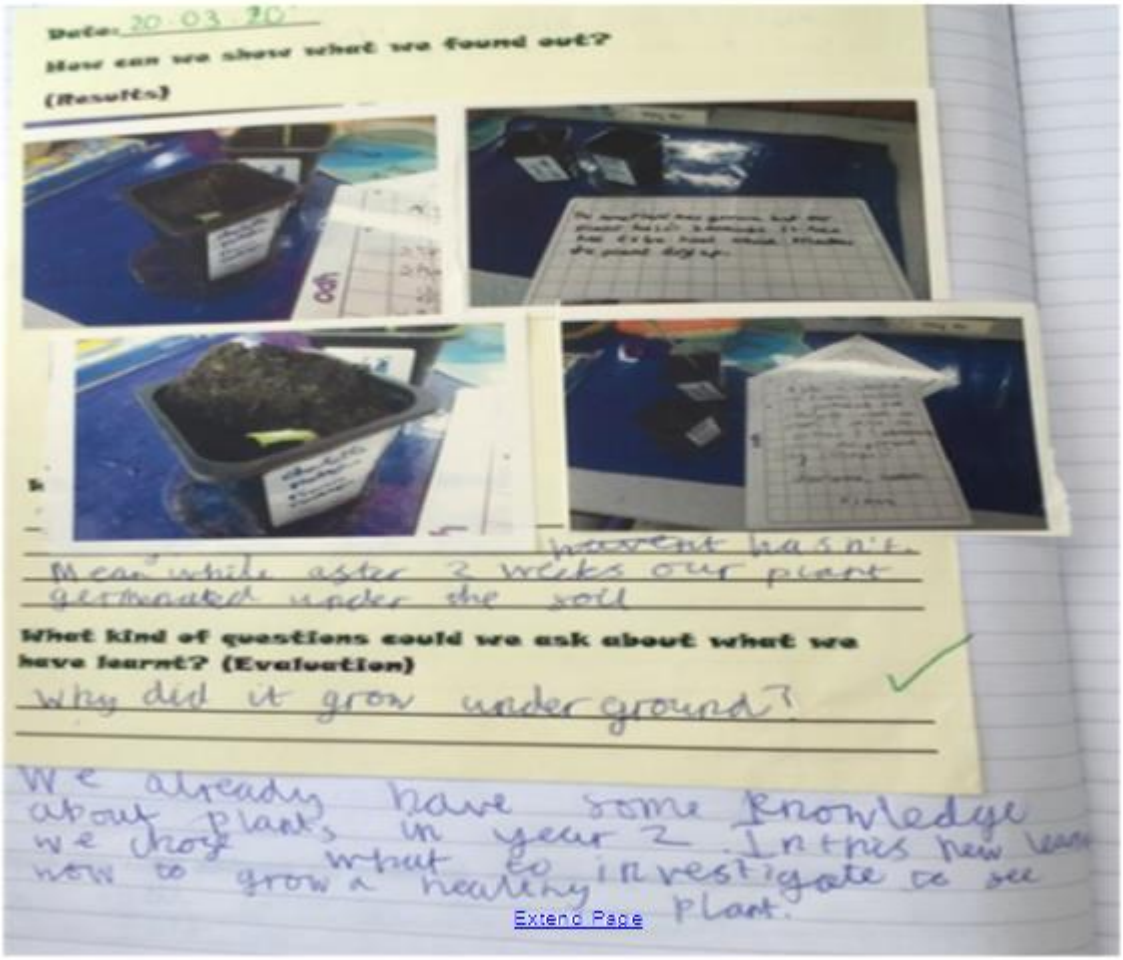
We found out that the bar and stro magnet were the strongest and the ball was ~~mo~~ weakest.

What kind of questions could we ask ab What we have learnt?

What ~~is~~ could happen if the paper clip was bigger?

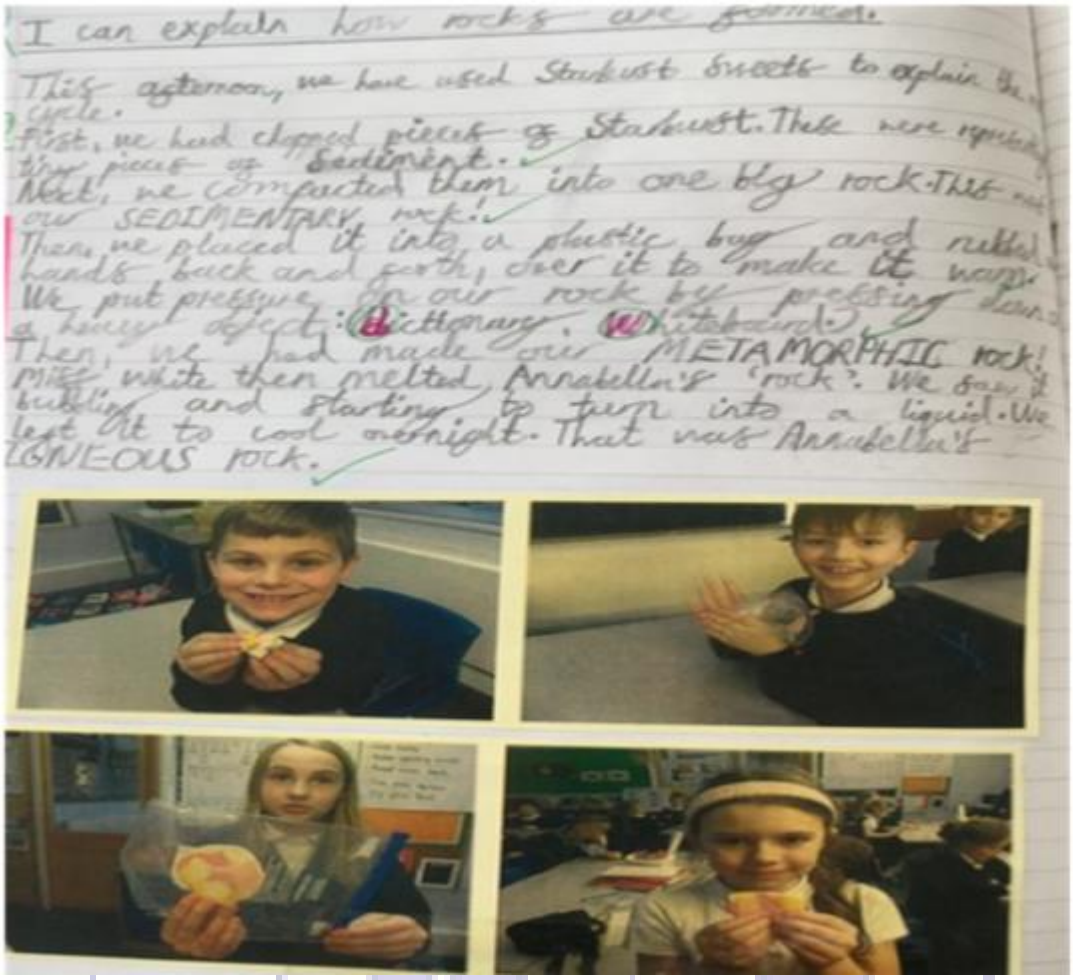
Year 3

Children observe and, over time, record what they see. They ask questions which can be investigated at a later date. They all build on prior learning from Year 2.



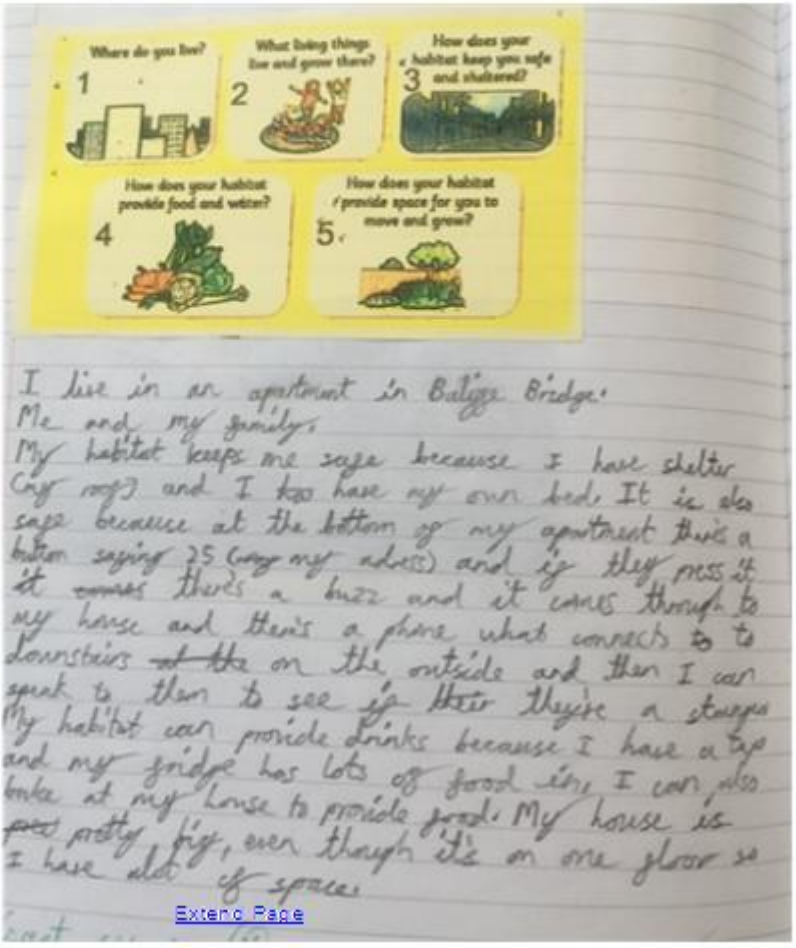
Year 3

Using correct vocabulary, children explain how they know rocks are formed.



Year 4

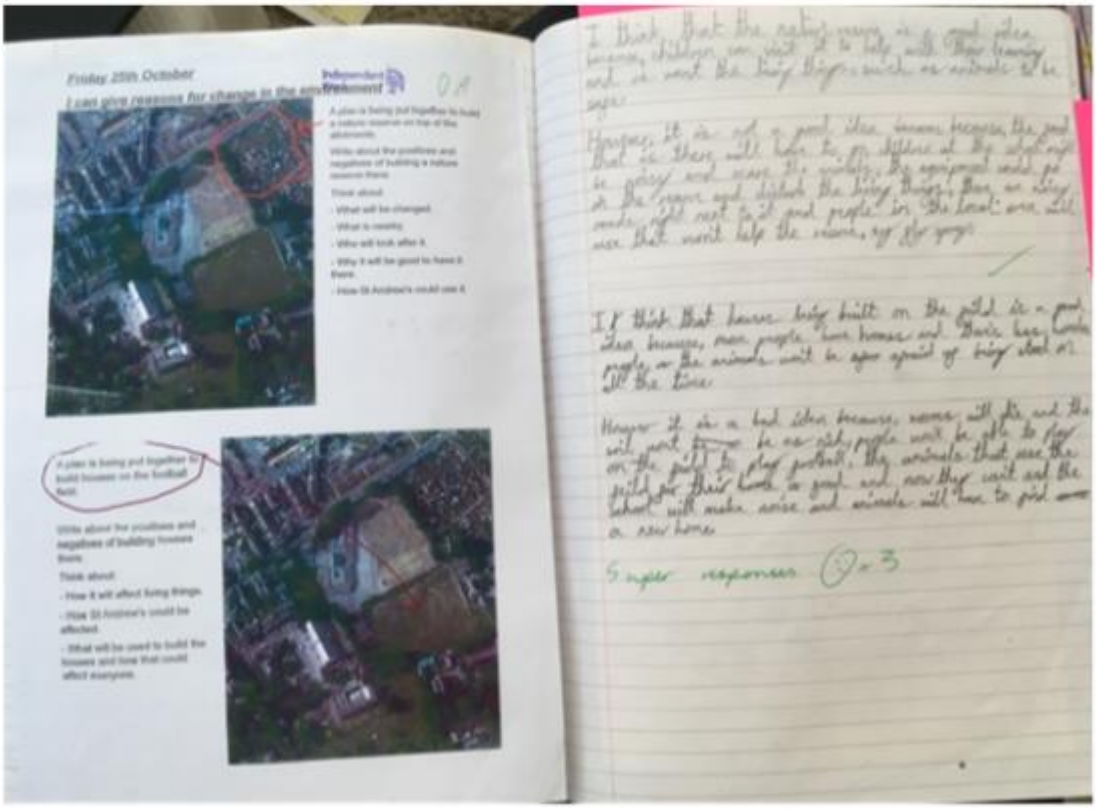
Children independently explain how their environment provides for them.



Year 4

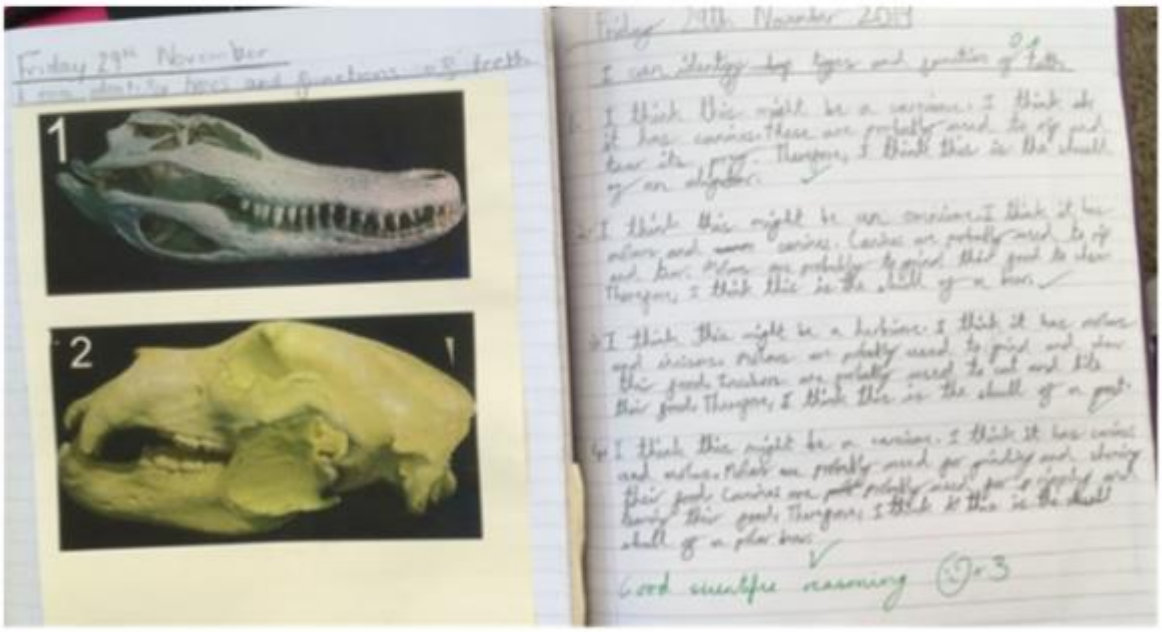
Using their knowledge of the local area, children imagine a scenario where a nature reserve is to be built. Is the proposed location adequate? What positive or negative reasons can be given to put it in a proposed location?

In a second scenario, should houses be built on the field next to the school?



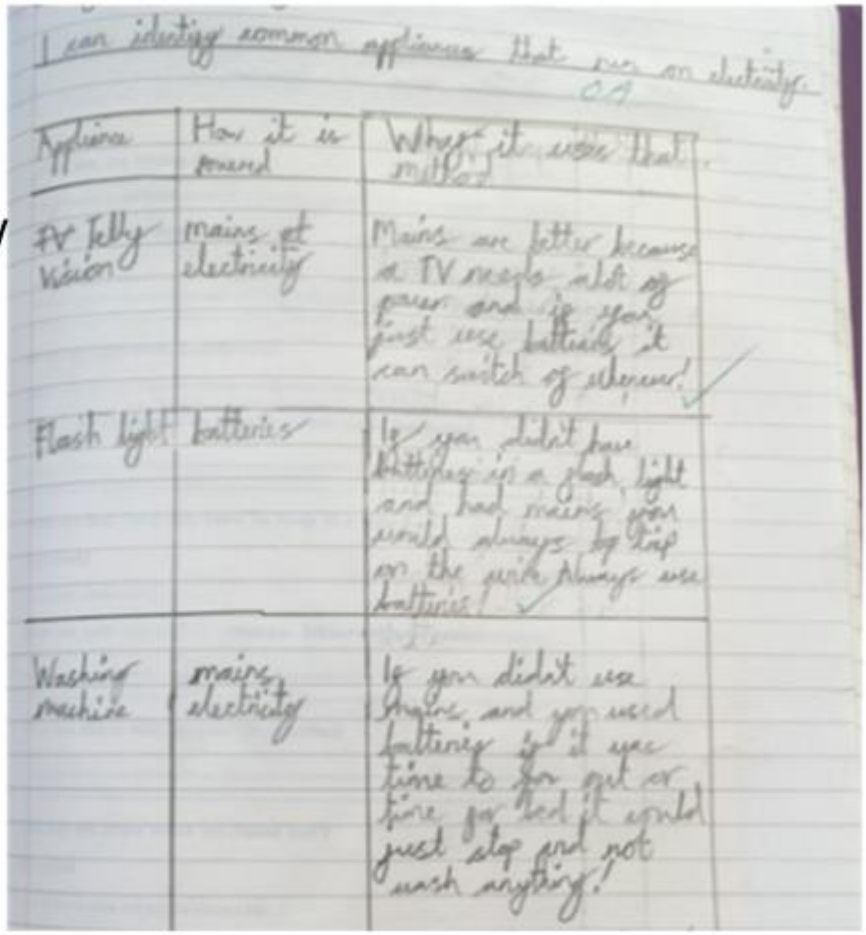
Year 4

Children hypothesise what the animal is based on being presented with a skull of it. They apply their learning of the functions of teeth and justify why or how they have come to that conclusion.



Year 4

Children justify the reason why appliances are mains or battery powered.

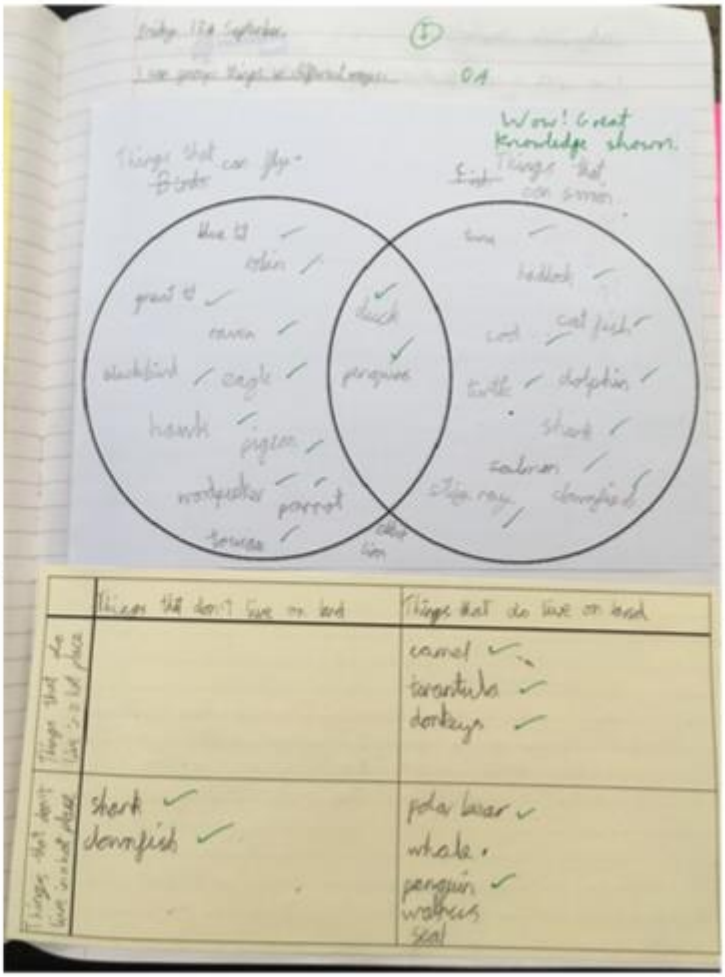


I can identify common appliances that run on electricity.

Appliance	How it is powered	Why it uses that method
TV Telly Vision	mains electricity	Mains are better because a TV needs alot of power and if you just use batteries it can switch off whenever!
Flash light	batteries	If you didn't have batteries in a flash light and had mains you would always be tied on the wire. Always use batteries!
Washing machine	mains electricity	If you didn't use mains and you used battery if it was time to go out or time for bed it would just stop and not wash anything!

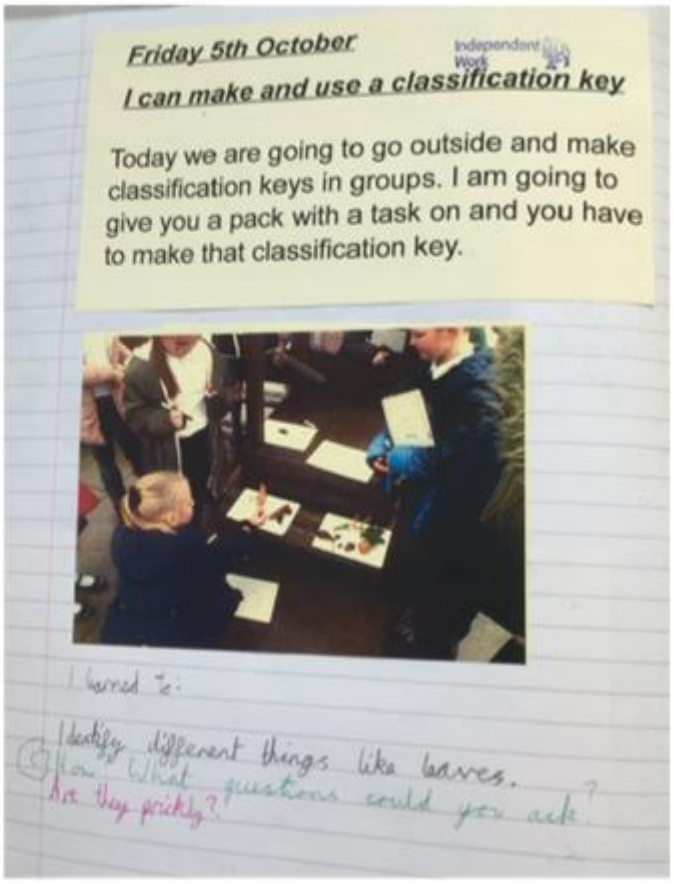
Year 4

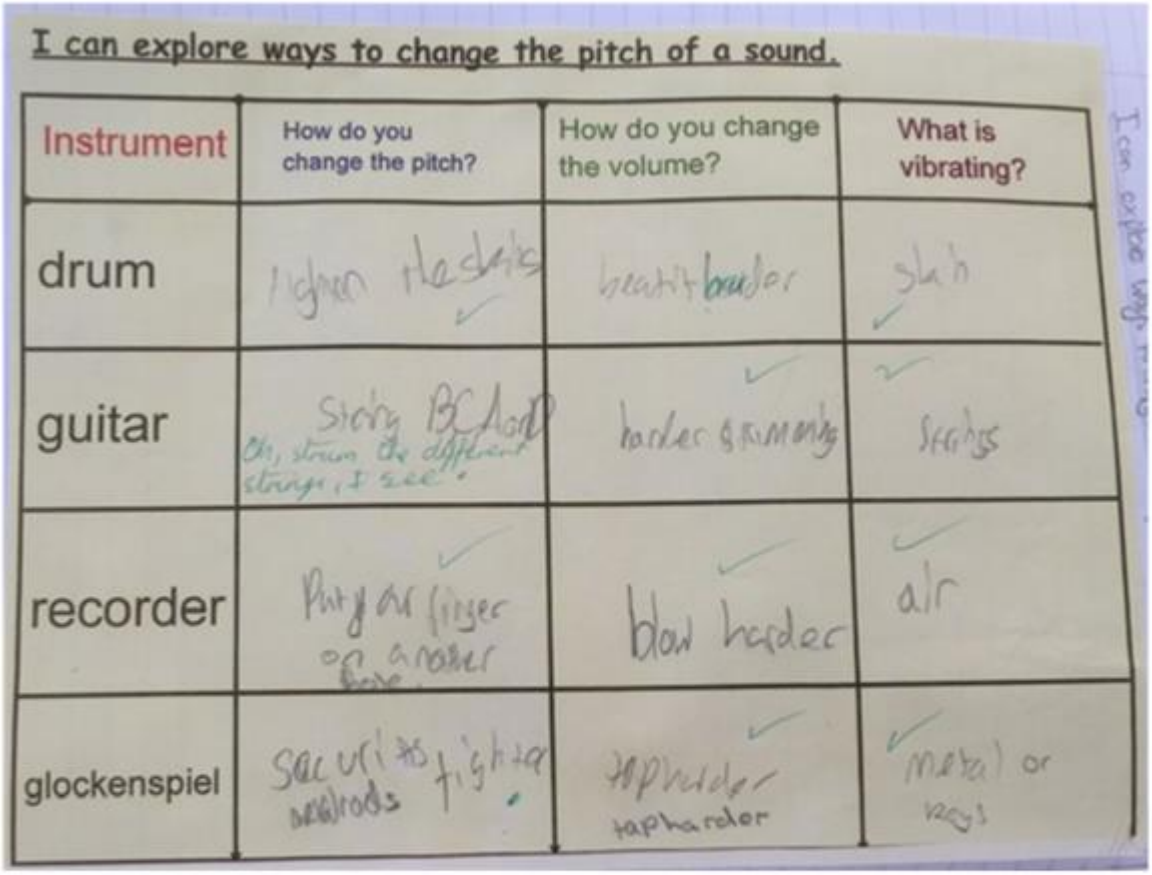
Children had a variety of animals which they sorted in to a Venn and Carroll diagram. They worked collaboratively to put the animals in to a group and thought of their own headings in order to group animals correctly.



Year 4

Children collaborate together to group and classify leaves found outside. They discuss and clarify effective questions to help sort the items.





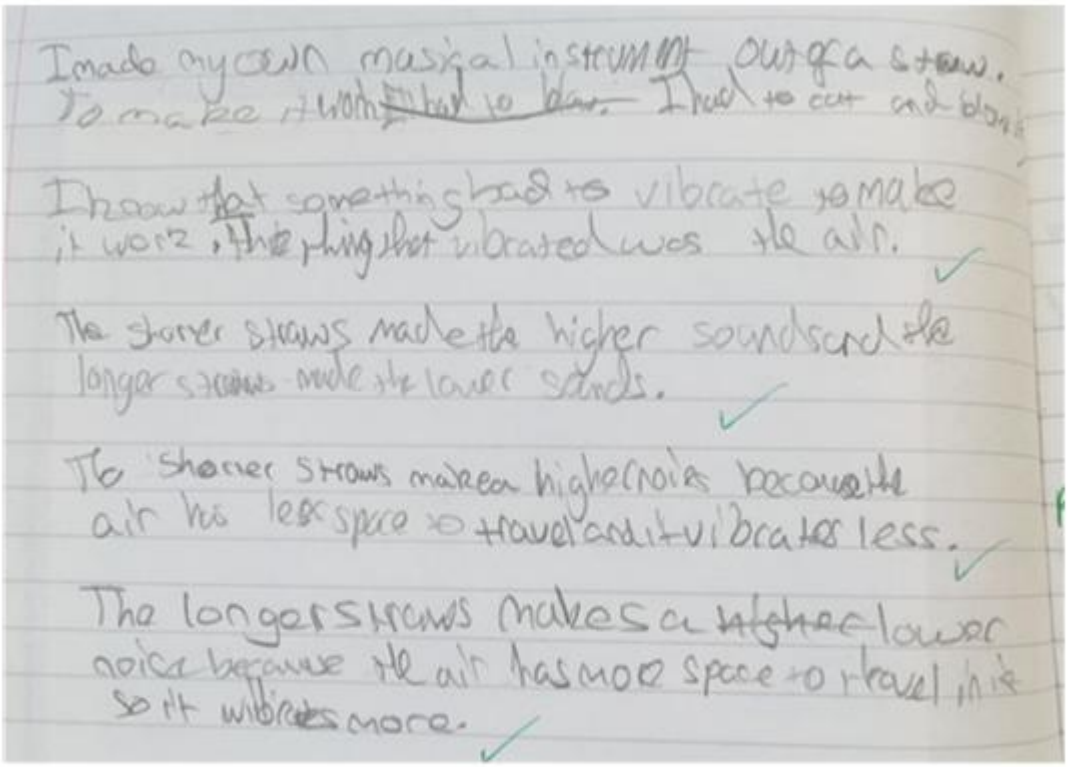
I can explore ways to change the pitch of a sound.

Instrument	How do you change the pitch?	How do you change the volume?	What is vibrating?
drum	higher tighter	beat it harder	skin
guitar	string BC chord Oh, strum the different strings, I see.	harder strumming	strings
recorder	Put your finger on a raster hole.	blow harder	air
glockenspiel	securities tighter	tap harder tap harder	metal or keys

Children investigate independently how instruments make a sound. They collaborate and discuss lines of enquiry.

Extend Page

Year 4



I made my own musical instrument out of a straw. To make it work I had to blow. I had to cut and blow

I know that something had to vibrate to make it work, the thing that vibrated was the air.

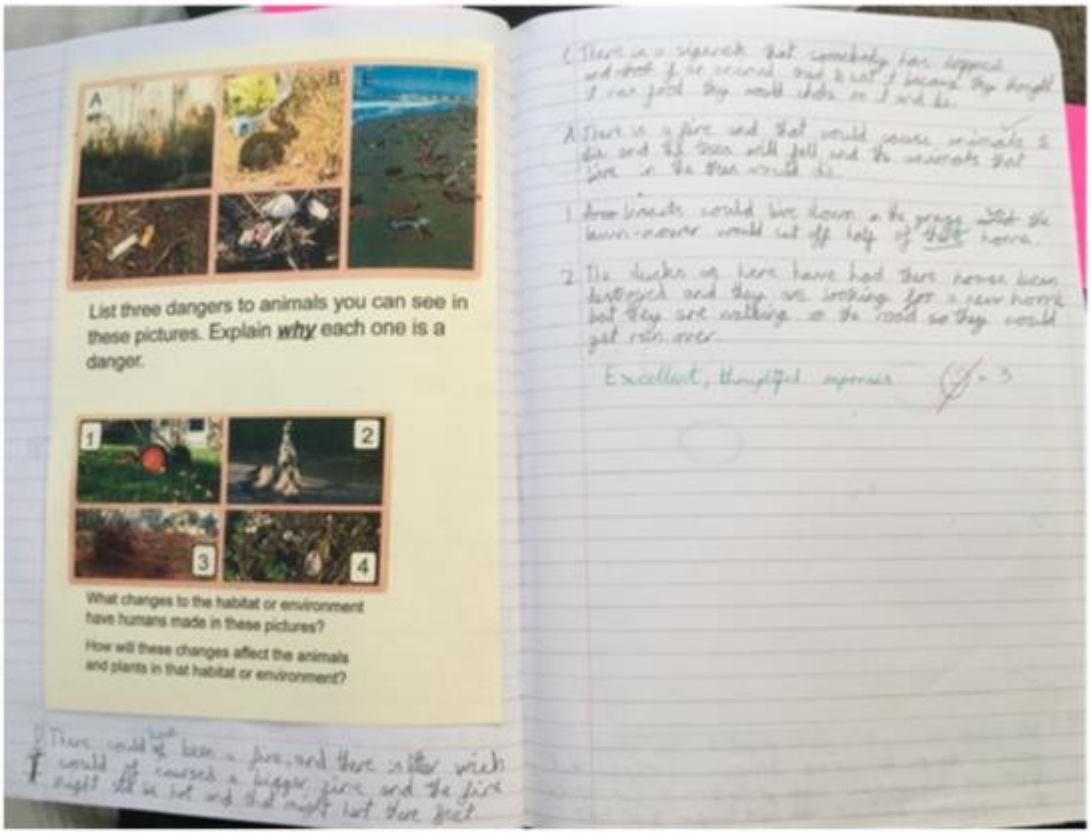
The shorter straws made the higher sounds and the longer straws made the lower sounds.

The shorter straws makes a higher noise because the air has less space to travel and it vibrates less.

The longer straws makes a ~~higher~~ lower noise because the air has more space to travel in it so it vibrates more.

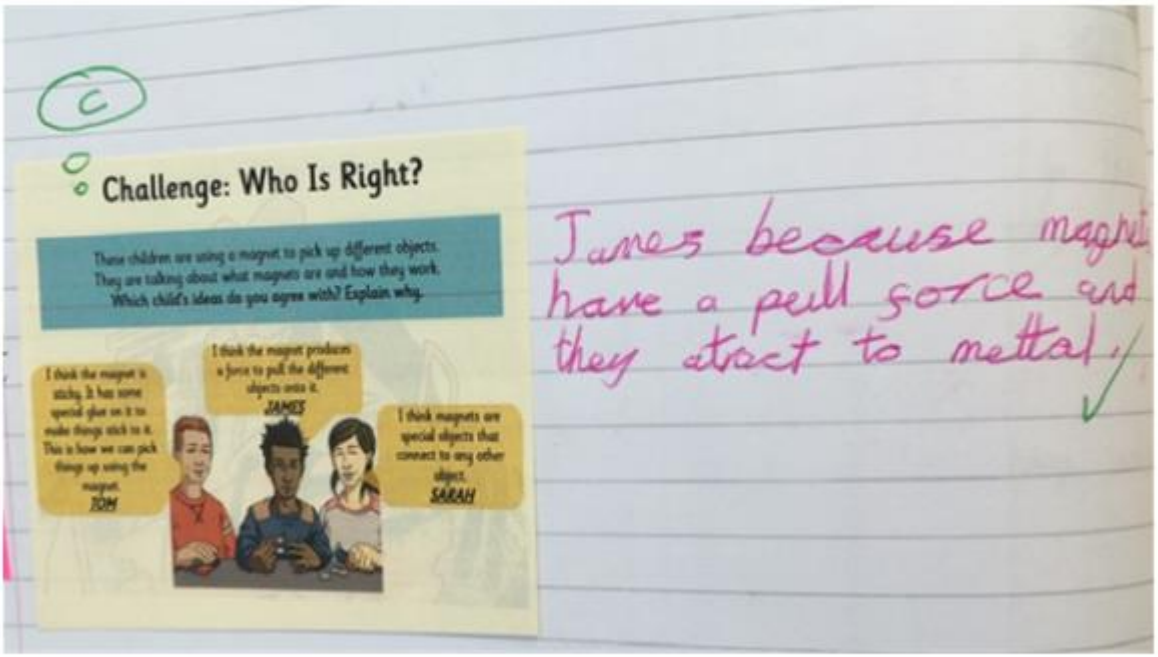
Children explain how sound can be heard in a variety of different scenarios.

Year 4



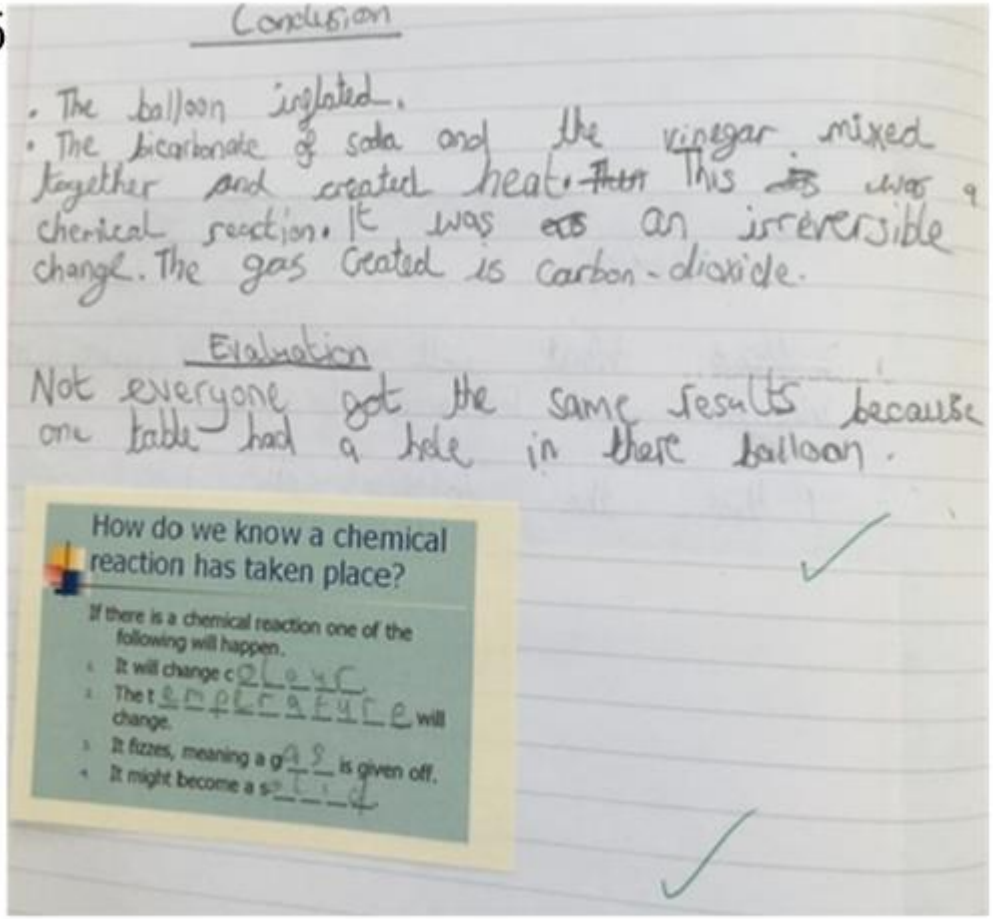
Children explain why animals are in danger and how animals could be affected. This activity encourages deeper thinking.

Year 5



Justifying opinions and explaining reasoning.

Year 5



Conclusion

- The balloon inflated.
- The bicarbonate of soda and the vinegar mixed together and created heat. ~~Then~~ This ~~is~~ was a chemical reaction. It was ~~an~~ an irreversible change. The gas created is carbon-dioxide.

Evaluation

Not everyone got the same results because one table had a hole in there balloon.

How do we know a chemical reaction has taken place?

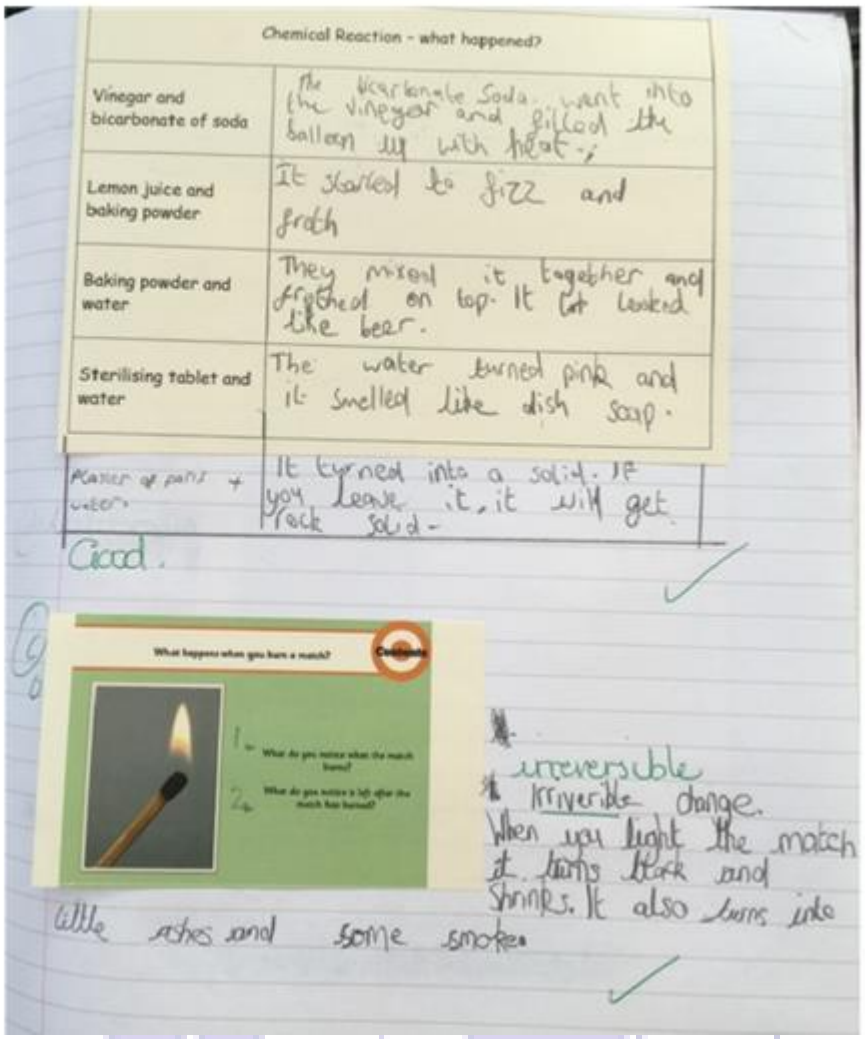
If there is a chemical reaction one of the following will happen.

- It will change c o l o u r
- The t e m p e r a t u r e will change.
- It fizzes, meaning a g a s is given off.
- It might become a s o l i d

Children explain why an investigation did and did not work and what they found out using correct vocabulary.

Year 5

Children explain what they have seen with key vocabulary. They explain their train of thought to a challenge question, again, with key vocabulary.



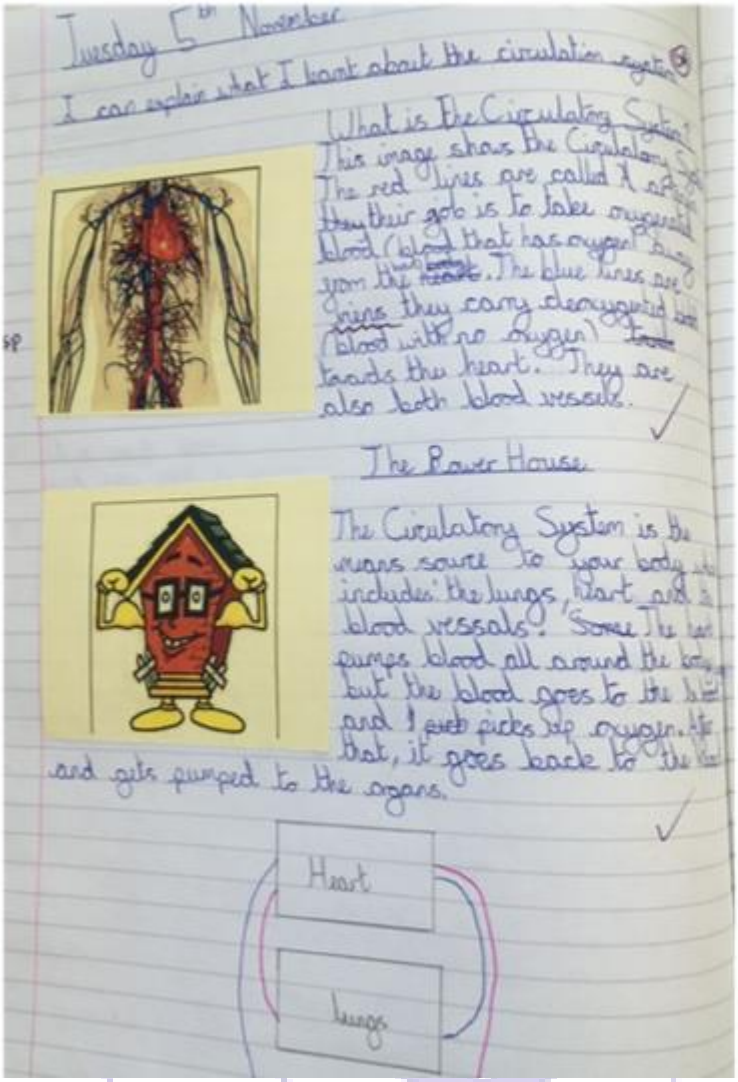
Chemical Reaction - what happened?

Vinegar and bicarbonate of soda	The bicarbonate soda went into the vinegar and filled the balloon up with heat.
Lemon juice and baking powder	It started to fizz and froth
Baking powder and water	They mixed it together and frothed on top. It then looked like beer.
Sterilising tablet and water	The water turned pink and it smelled like dish soap.
Plaster of paris + water	It turned into a solid. If you leave it, it will get rock solid.

Good.

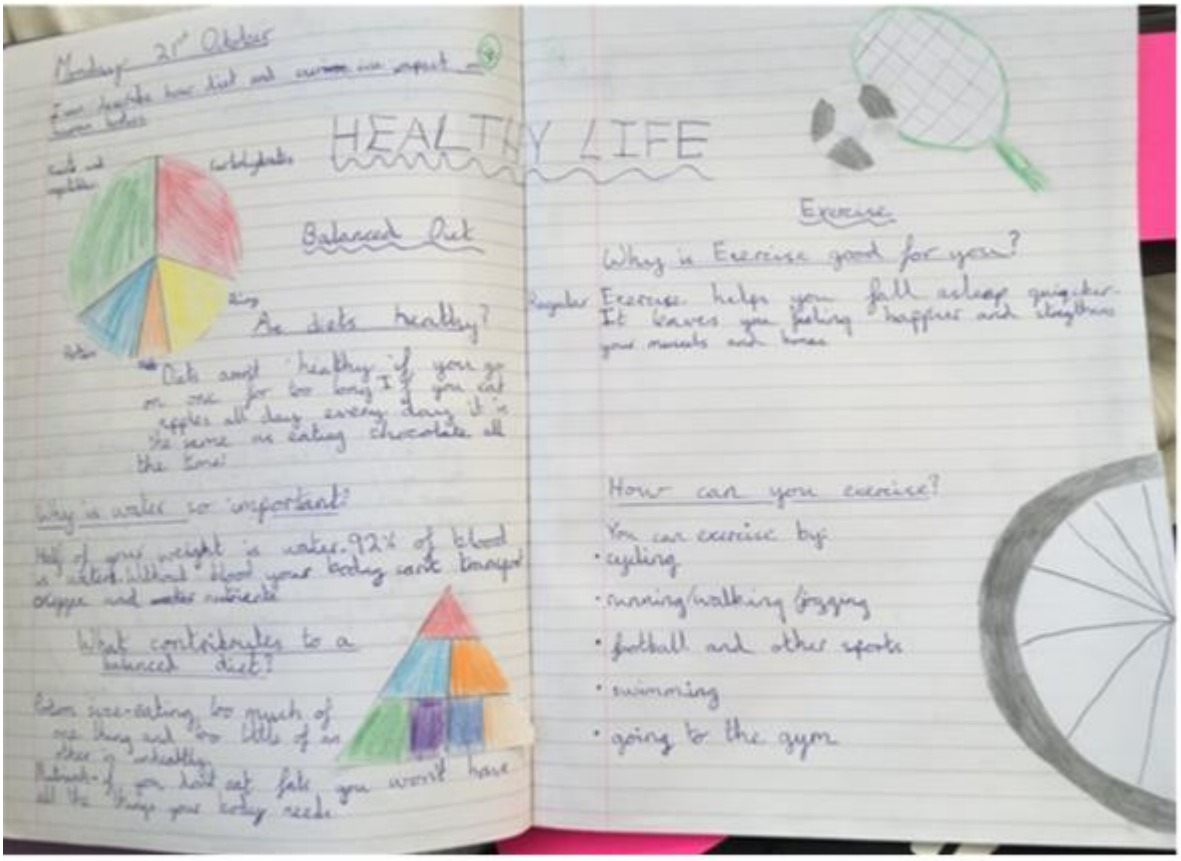
irreversible
Irriversible change.
When you light the match it turns black and shrinks. It also turns into ash and some smoke.

Year 6



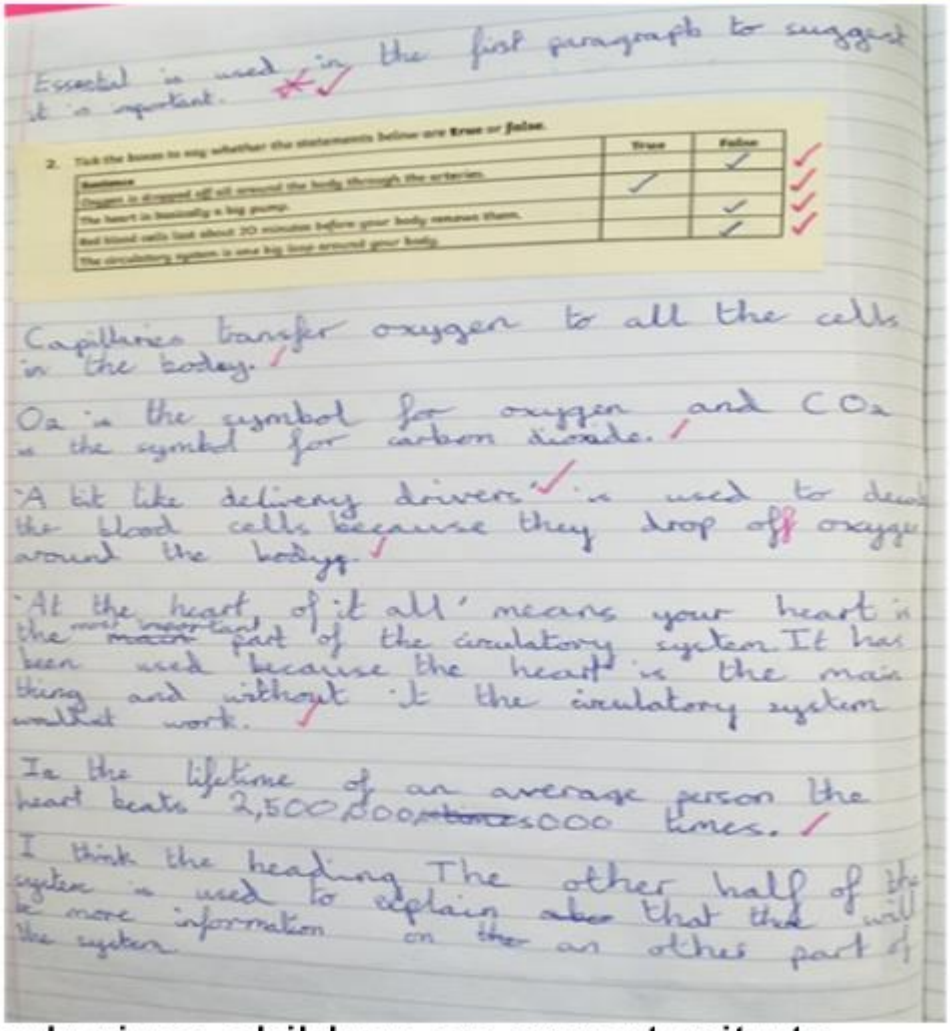
Children reflect on their learning and explain what they know by defining a line of enquiry.

Year 6



In this work children pose questions to themselves and they can show how they justify their facts and opinions.

Year 6



Essential is used in the first paragraph to suggest it is important.

2. Tick the boxes to say whether the statements below are **true** or **false**.

	True	False
Resistance		✓
Oxygen is dropped off all around the body through the arteries.	✓	
The heart is basically a big pump.		✓
Red blood cells last about 20 minutes before your body removes them.		✓
The circulatory system is one big loop around your body.		✓

Capillaries transfer oxygen to all the cells in the body.

O_2 is the symbol for oxygen and CO_2 is the symbol for carbon dioxide.

'A bit like delivery drivers' is used to describe the blood cells because they drop off oxygen around the body.

'At the heart of it all' means your heart is the ~~most~~ important part of the circulatory system. It has been used because the heart is the main thing and without it the circulatory system wouldn't work.

In the lifetime of an average person the heart beats 2,500,000~~,000~~,000 times.

I think the heading The other half of the system is used to explain ~~abo~~ that the will be more information on the an other part of the system.

This work gives children an opportunity to justify their opinions about how blood is transferred around the body.

STICKY KNOWLEDGE DOCUMENT

This document intends to outline the overall 'sticky knowledge' children should achieve at St Andrew's and the individual year group sticky knowledge. The document content is referred to in the school's curriculum intent, implementation and impact document for Science.

Sticky knowledge is referred to as knowledge that we want to stick with the children as they move through school. In Science, the overall sticky knowledge we want the children to leave with by the end of KS2 is as follows:

Science 'Sticky Knowledge' – what children need to know by the end of Key Stage 2

WORKING SCIENTIFICALLY

- The way to carry out a scientific investigation following our proforma in school.
- Examples of famous scientists and what they did in their chosen scientific field.

BIOLOGY

- Know a variety of living things and how to look after those things through an understanding of what is in living things' bodies (animals and humans).
- Features of plants and how to look after them.

PHYSICS

- How natural phenomena like electricity, magnetism, light, sound and gravity are created and give examples of how we can harness and use this phenomena.
- Features of the solar system and the night sky.

CHEMISTRY

- Identify some types of rocks and know how soil and fossils are made.
- Where we see changes of state (including reversible and irreversible changes) and examples of this.

The following section of the document will show sticky knowledge the children should learn in each year group. Each page will include the scientific strands as sub headings. Not all strands will have content in a particular year group so the sticky knowledge section will be blank on purpose.

Sticky knowledge for each year group

NC 2014	Year 3	Year 4	Year 5	Year 6
Plants	Know the functions and parts of flowering plants. Know what a plant needs to grow healthily Know the life cycle of a plant.			
Animals including humans	Know the basic food groups and examples of foods. Know why humans and animals have skeletons and muscles.	Know the types of teeth and their functions. Know the main parts of the digestive system. Know how to construct a food chain.	Know how humans change from birth to old age. Know that animals have different gestation periods to humans.	Know the names and functions of the parts of the circulatory system. Know what the effects of having a good or poor lifestyle has on the body.
Living things and habitats		Know the names of the 5 ways to group animals. Know examples of how humans effect animals' environments	Know that different living things have different life cycles and give examples. Know how plants and some animals reproduce.	Know how animals, plants and micro-organisms can be grouped. Know why plants and animals are grouped.
Evolution and inheritance				Know how a living thing might be adapted to its environment. Know how or give an example of a living thing that has changed over time.
Rocks	Know examples of types of rocks. Know how fossils and soil are formed.			
Properties and changes of materials			Know how mixtures can be separated and the processes involved. Know what reversible and irreversible changes are and give examples.	
States of matter		Know the properties of a solid, liquid and gas. Know how to change a state. Know the processes in the water cycle.		
Light	Know how shadows are formed and ways on how they change. Know that light can reflect.			Know that light travels in straight lines. Know how we use light sources to help us see things.
Sound		Know how a sound is made. Know the difference between pitch and sound.		
Forces and Magnets	Know that magnets attract, repel, and explain how this happens using the term 'poles'. Know some magnetic and non-magnetic materials.		Know examples of different types of forces and give examples of where we see them.	
Earth and Space			Know the names of the planets. Know how the earth, moon, planets and sun move in relation to each other.	
Electricity		Know how to make a complete circuit. Know what a conductor and an insulator is.		Know how to draw a circuit diagram with correct symbols. Know that the voltage of a battery affects how a component works.

Resources

Online resources we subscribe to:

Testbase – use testbase to create bespoke assessment papers for the end of a topic.

Others that may be helpful:

Explorify – Create your own log in and use the pictorial resources to help promote deeper thinking. Ranges of useful activities include 'odd one out', 'zoom in/out' and 'What's going on?'

STEM – Create your own log in first. Mainly used to book STEM ambassadors to come in to school and inspire children to see how Science is used in the real world. There are activities as powerpoints, worksheets and videos to help promote learning.

Teaching Ideas – Worksheets and activities.

Hamilton Trust – Ideas for investigations and activities planned out and with differentiation. No log in required. Resources provided. Clear instructions for how to carry out learning/tasks/activities.

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