Science at Peters Hill

RESEARCH

Summary of Ofsted research review

SCIENCE RESEARCH SUMMARY FOR PRIMARY LEADERS AND TEACHERS

(Based on Ofsted's Report)

Children begin their formal science learning in **EYFS**. This time should be used to develop a broad **scientific vocabulary** and provide experiences of the phenomena children will learn about later in primary.

Teaching and learning in science is most effective when it is broken into **small**, manageable **chunks**. This avoids overloading **working memory**, and allows children to understand key components to support their conceptual development.

Working scientifically should be considered as **disciplinary knowledge** about how scientists work and learn. This knowledge contains the what, why, when, where and why of working scientifically skills.

Teachers should identify the best opportunities to teach **disciplinary knowledge** alongside the **substantive knowledge** of the curriculum. This may involve knowledge of how ideas have changed over time e.g. evolution.

Science is **hard** for pupils to learn because a lot of science contradicts the observations we make in every day life. This means that **misconceptions** are rife and can be enforceable. Only when pupils develop a strong understanding can some misconceptions be ready to address. ..

Pupils do not **transfer** their learning from one context to another that easily. Each time a scientific skill is being used, modelling, explanation and feedback are necessary to lead children to success .

Although **practical work** is often enjoyable, this is not a justification in itself for it to be used. Rather, practical work should be used purposefully in line with curricular goals..

Teacher demonstration is also an equally valuable tool, and can actually be more effective due to the way it can increase working memory capacity for children.

Explanations make a critical difference to the quality of teaching, and are often reliant on excellent subject knowledge. Leaders should prioritise developing teachers' subject expertise to improve teaching and learning.

Retrieval practice in science is effective in preventing children from forgetting what they have learned. It is most useful when it is used so that children remember their learning in a way which reinforces their conceptual understanding.

The **sequencing** of the curriculum is **incredibly important**, and time needs to be appropriately attributed to each of the components existing in the curriculum. An ad-hoc approach to topics does not support learning in a way that careful planning and sequencing can achieve.

Enquiry-based learning - which is different to the scientific enquiries which the National Curriculum stipulates children learn - has variable outcomes in its effectiveness. Ofsted suggest that **teacher-directed instruction** can lead to **higher quality** learning

Language development is strongly associated with achievement in science. This means that every opportunity should be taken where children can not only develop in English, but also learn the language of science through stories, texts, songs, rhymes and poems. Repeated exposures to such texts can help children acquire new information with each reading or recital, thus building their knowledge base and understanding.

For a more detailed summary, check out my blog post at **www.marcrhayes.com** **@mrmarchayes**

Substantive Knowledge

“This is the knowledge produced by the academic subject. In science, this involves concepts which form the underpinning structure of the subject, e.g. respiration, evolution and the idea of a force. The list of substantive knowledge for subjects is well, substantial, and must be carefully sequenced over time. But we don’t always start with the easiest knowledge. Instead we must start with the most fundamental, helpful and extending knowledge”

Dr Jasper Green - HMI

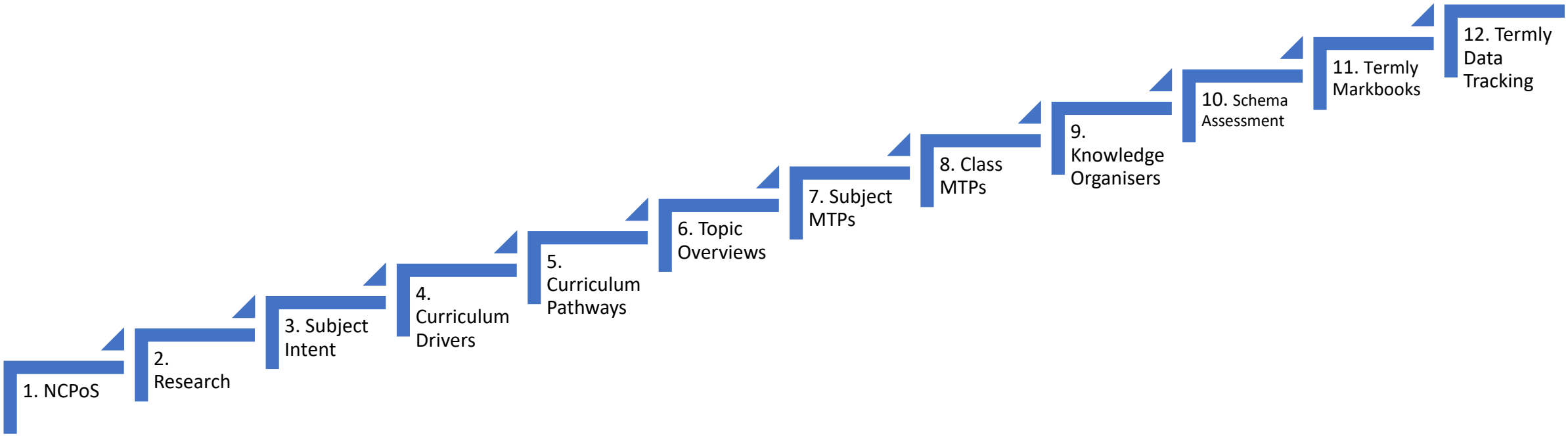
Disciplinary Knowledge

“Then there is **disciplinary knowledge**. In science, this is the knowledge needed to collect, understand and evaluate scientific evidence. It's the scientific method, i.e. changing one variable whilst keeping everything else the same – and seeing what happens. We use this knowledge every day. Think back to when your TV remote last stopped working. First you banged it, then you wiped the sensor, finally you changed the battery. Each time you changed one variable (the independent variable) before measuring its effect (the dependent variable) whilst keeping everything else the same (the control variables); you see, science is useful”

Dr Jasper Green - HMI

Our Process

The Process at Peters Hill
Our 12 step approach



INTENT

- **At Peters Hill, our Science curriculum strives towards the following aims:**

- For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science.
- For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest.
- For children to be able to work scientifically in order to investigate using scientific principles.

- **We believe that in Science, all children should:**

- Work both collaboratively and independently to investigate scientific concepts
- Develop an extensive knowledge of a range of scientific vocabulary and be able to use them in context.
- Begin to recognise how scientific concepts relate to their everyday lives.
- Learn to consider questions that they are able to investigate scientifically, for themselves.

- Children become proficient scientists through building substantive knowledge across the specific pathways of;

- Pathway 1 - Biology
  Pathway 2 - Chemistry
  Pathway 3 – Physics

- Children develop disciplinary knowledge through working scientifically and conducting a range of scientific enquiries across all topics taught This is;

  Pathway 4 - Working scientifically.

- **Curriculum Drivers - How do our whole school values link to the subject?**
- AMBITION (Success) – Develop a progression of investigative skills to enable children to independently test concepts. Children learn to record their investigations and results in a variety of ways and learn to identify the most effective method Teach series of 'knowledge-based lessons in a variety of ways, including the use of practical, research, discussion and analysis. Knowledge organisers will be in place to ensure learning outcomes are ambitious for all pupils.
- BELIEF (Confidence)– Children will develop scientific vocabulary in a variety of ways enabling them to discuss scientific concepts with confidence. We will encourage children to openly share their ideas and discuss them and to work collaboratively usually within year groups but also allowing for cross-year group interaction. Learning logs will highlight the children's learning and enable them to celebrate their achievements.
- COMPASSION (Motivation) – Teachers will use 'hooks' in lessons to motivate children's interest. (practical experiments, videos, photographs, questions etc) Children will be encouraged to understand how the concepts relate to their own lives and to further develop their knowledge by asking further questions. Lessons should be practical and 'hands-on' wherever possible. Children will learn about scientists from many backgrounds, ethnic groups and genders so that children understand that science is for everyone.
- PRIDE (Knowledge)– Build up sequences of lessons building on previous knowledge and supported with the use of knowledge organisers. All staff will teach science with a clear understanding of what has previously been taught using the curriculum pathways document. Develop the acquisition of specific scientific vocabulary and deeper learning will be developed on a regular basis.
- RESPECT (Responsibility) – Build in knowledge and understanding of safety and respect for resources. Children will learn to respect their environments – both immediate and wider, including those of plants and other animals. Children learn to respect the ideas and knowledge of others to encourage open and confident discussion.

Key Competencies

- The following documents set out the key competencies developed across the range of topics in each year group.
- These key competencies are set out as pathways to demonstrate how they link and progress throughout the school.
- These competencies are then planned into each topic through the half termly medium term planning process.
- These competencies combine to make the total schema that teaching staff use to assess the children at the end of the topic. This generates assessment judgements as set out on the following slide and happens three times a year.
- These total judgements average throughout the term. This total will fall between 1 to 5 depending on the outcome of each topic.

Novice	Simple idea	Relational idea	Multiple Links	Expert understanding
1	2	3	4	5
The task is not attacked appropriately; the pupil hasn't really understood the point and uses too simple a way of going about it.	The pupil's response only focuses on one relevant aspect.	The pupil's response focuses on several relevant aspects but they are treated independently and additively. Assessment of this level is primarily quantitative.	The different aspects have become integrated into a coherent whole. This level is what is normally meant by an adequate understanding of some topic.	The previous integrated whole may be conceptualised at a higher level of abstraction and generalised to a new topic or area.
Well below - Has significant difficulties in successfully accessing the competenies	Below - Can access key competencies of the schema but need significant support to do so.	Emerging - Started to unlock key competencies of the schema but not yet secure. Support can be required.	Secure - Securely unlocked the key competencies of the schema. No support is required.	Mastered - Can apply the competencies of the schema with fluency in different contexts.

Key Competency Expectations

Below
Working well below the standard. Has significant difficulties in accessing the key competencies.

Below
Working below the standard. Can access key competencies of the schema but needs support to do so.

Emerging
Emerging towards the standard. Started to unlock key competencies of the schema but not yet secure. Support can be required.

Secure
Meeting the standard. Securely unlocked the key competencies of the schema. No support is required.

Mastered
High attaining within the standard. Can apply the competencies of the schema with fluency in different contexts.

Pathway 1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Physics	**Seasonal changes** • I can observe and comment on changes in the seasons. • I can name the seasons and suggest the type of weather in each season.	Physics No content	**Light** • I can describe what dark is (the absence of light). • I can explain that light is needed in order to see. • I can explain that light is reflected from a surface. • I can explain and demonstrate how a shadow is formed. • I can explore shadow size and explain. • I can explain the danger of direct sunlight and describe how to keep protected. **Forces and magnets** • I can explore and describe how objects move on different surfaces. • I can explain how some forces require contact and some do not, giving examples. • I can predict whether materials will be magneticand carry out an enquiry to test this out. • I can describe how magnets as having two poles. • I can predict whether magnets will attract or repel another magnet and explain the reason.	**Sound** • I can describe how sound is made. • I can explain how sound travels from a source to our ears. • I can explain the place of vibration in hearing. • I can explore the correlation between pitch and the object producing a sound. • I can explore the correlation between the volume of a sound and the strength of the vibrations that produced it. • I can describe what happens to a sound as it travels away from its source. **Electricity** • I can identify and name appliances that require electricity to function. • I can construct a series circuit. • I can identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers). • I can draw a circuit diagram. • I can predict and test whether a lamp will light within a circuit. • I can describe the function of a switch in a circuit. • I can describe the difference between a conductor and insulators; giving examples of each.	**Earth and space** • I can describe and explain the movement of the Earth and other planets relative to the Sun. • I can describe and explain the movement of the Moon relative to the Earth. • I can explain and demonstrate how night and day are created. • I can describe the Sun, Earth and Moon (using the term spherical). **Forces** • I can explain what gravity is and its impact on our lives. • I can identify and explain the effect of air resistance. • I can identify and explain the effect of water resistance. • I can identify and explain the effect of friction. • I can explain how levers, pulleys and gears allow a smaller force to have a greater effect.	**Light** • I can explain how light travels. • I can explain and demonstrate how we see objects. • I can explain why shadows have the same shape as the object that casts them. • I can explain how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc. **Electricity** • I can explain how the number & voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer. • I can compare and give reasons for why components work and do not work in a circuit. • I can draw circuit diagrams using correct symbols.

Key Competencies

Pathway 2	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Chemistry	**Everyday materials** • I can distinguish between an object and the material it is made from. • I can explain the materials that an object is made from. • I can name wood, plastic, glass, metal, water and rock. • I can describe the properties of everyday materials. • I can group objects based on the materials they are made from.	**Uses of everyday materials** • I can identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard. • I can suggest why a material might or might not be used for a specific job. • I can explore how shapes can be changed by squashing, bending, twisting and stretching.	**Rocks** • I can compare and group rocks based on their appearance and physical properties, giving a reason. • I can describe how fossils are formed. • I can describe how soil is made. • I can describe and explain the difference between sedimentary and igneous rock.	**States of matter** • I can group materials based on their state of matter (solid, liquid, gas). • I can describe how some materials can change state. • I can explore how materials change state. • I can measure the temperature at which materials change state. • I can describe the water cycle. • I can explain the part played by evaporation and condensation in the water cycle.	**Properties and changes of materials** • I can compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets). • I can describe how a material dissolves to form a solution; explaining the process of dissolving. • I can describe and show how to recover a substance from a solution. • I can describe how some materials can be separated. • I can demonstrate how materials can be separated (e.g. through filtering, sieving and evaporating). • I know and can demonstrate that some changes are reversible and some are not. • I can explain how some changes result in the formation of a new material and that this is usually irreversible. • I can discuss reversible and irreversible changes. • I can give evidenced reasons why materials should be used for specific purposes.	Chemistry No content

Key Competencies

Pathway 3	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Biology	• I can name a variety of common wild and garden plants. • I can name the petals, stem, leaf and root of a plant. • I can name the roots, trunk, branches and leaves of a tree. • I can name a variety of animals including fish, amphibians, reptiles birds and mammals. • I can classify and name animals by what they eat (carnivore, herbivore and omnivore). • I can sort animals into categories (including fish, amphibians, reptiles, birds and mammals). • I can sort living and non-living things. • I can name the parts of the human body that I can see. • I can link the correct part of the human body to each sense.	• I can identify things that are living, dead and never lived. • I can describe how a specific habitat provides for the basic needs of things living there (plants and animals). • I can identify and name plants and animals in a range of habitats. • I can match living things to their habitat. • I can describe how animals find their food. • I can name some different sources of food for animals. • I can explain a simple food chain. • I can describe how seeds and bulbs grow into plants. • I can describe what plants need in order to grow and stay healthy (water, light & suitable temperature). • I can explain the basic stages in a life cycle for animals, including humans. • I can describe what animals and humans need to survive. • I can describe why exercise, a balanced diet and good hygiene are important for humans.	• I can describe the function of different parts of flowing plants and trees. • I can explore and describe the needs of different plants for survival. • I can explore and describe how water is transported within plants. • I can describe the plant life cycle, especially the importance of flowers. • I can explain the importance of a nutritious, balanced diet. • I can research and classify animals according to their dietary needs. • I can describe the purpose of the skeleton in humans and otheranimals. • I can discover and explain how the muscular system helps us to move.	• I can group living things in different ways. • I can use classification keys to group, identify and name living things. • I can create classification keys to group, identify and name living things (for others to use). • I can describe how changes to an environment could endanger living things. • I can identify and name the parts of the human digestive system. • I can describe the functions of the organs in the human digestive system. • I can identify and describe the different types of teeth in humans. • I can describe the functions of different human teeth. • I can use food chains to identify producers, predators and prey. • I can construct food chains to identify producers, predators and prey	• I can describe the life cycle of different living things, e.g. mammal, amphibian, insect bird. • I can describe the differences between different life cycles. • I can describe the process of reproduction in plants. • I can describe the process of reproduction in animals. • I can create a timeline to indicate stages of growth in humans.	• I can classify living things into broad groups according to observable characteristics and based on similarities & differences. • I can describe how living things have been classified. • I can give reasons for classifying plants and animals in a specific way. Animals, including humans • I can identify and name the main parts of the human circulatory system. • I can describe the function of the heart, blood vessels and blood. • I can discuss the impact of diet, exercise, drugs and life style on health. • I can describe the ways in which nutrients and water are transported in animals, including humans. Evolution and inheritance • I can describe how the earth and living things have changed over time. • I can explain how fossils can be used to find out about the past. • I can explain about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents). • I can explain how animals and plants are adapted to suit their environment. • I can link adaptation over time to evolution. • I can explain evolution.

Key Competencies

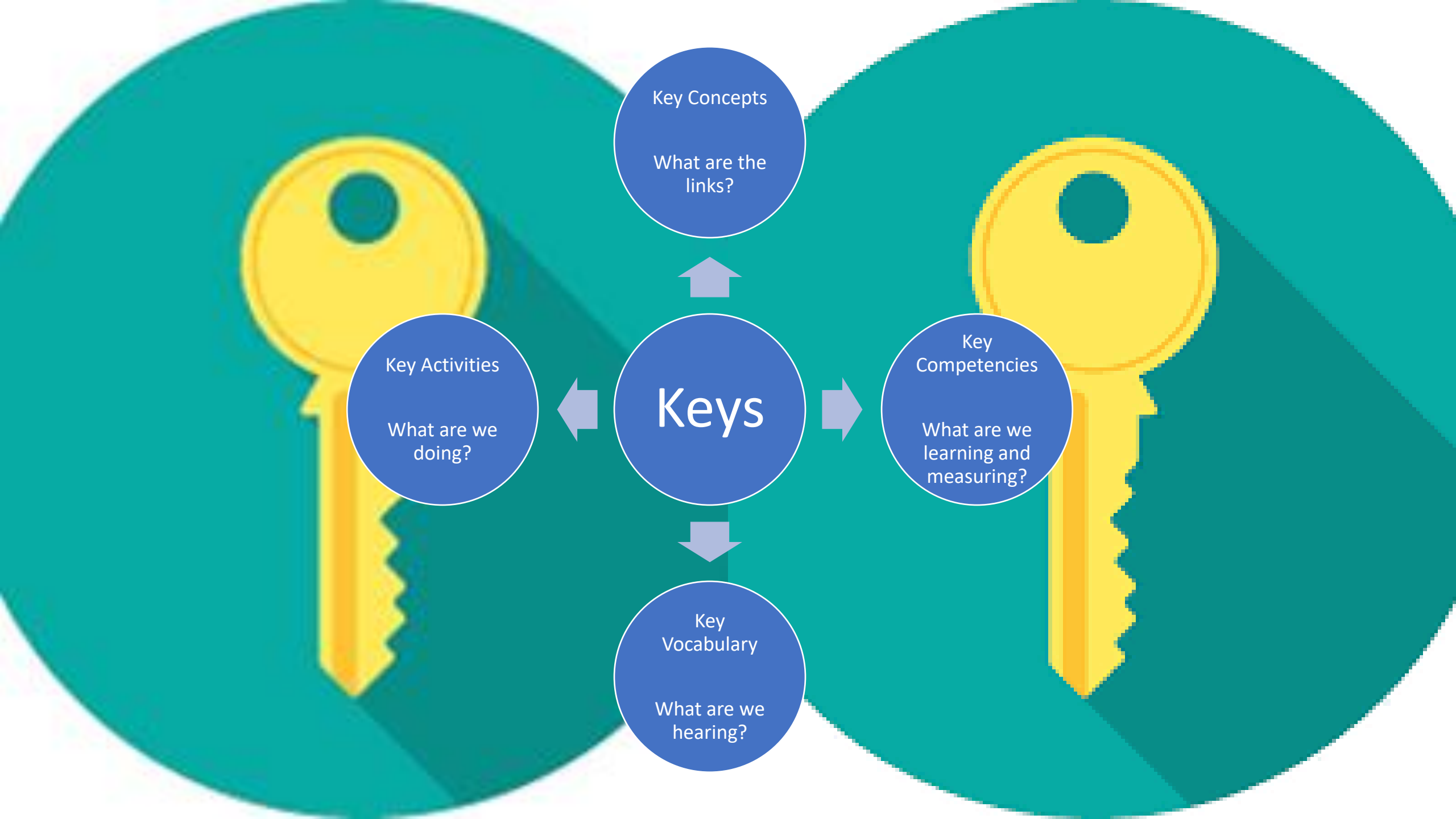
Pathway 4	By the end of Year 2	By the end of Year 4	By the end of Year 6
Working Scientifically	• I can ask simple scientific questions. • I can use simple equipment to make observations. • I can carry out simple tests. • I can identify and classify things. • I can suggest what I have found out. • I can use simple data to answer questions	• I can ask relevant scientific questions. • I can use observations and knowledge to answer scientific questions. • I can set up a simple enquiry to explore a scientific question. • I can set up a test to compare two things. • I can set up a fair test and explain why it is fair. • I can make careful and accurate observations, including the use of standard units. • I can use equipment, including thermometers and data loggers to make measurements. • I can gather, record, classify and present data in different ways to answer scientific questions. • I can use diagrams, keys, bar charts and tables; using scientific language. • I can use findings to report in different ways, including oral and written explanations, presentation. • I can draw conclusions and suggest improvements. • I can make a prediction with a reason. • I can identify differences, similarities and changes related to an enquiry.	• I can plan different types of scientific enquiry. • I can control variables in an enquiry. • I can measure accurate and precisely using a range of equipment. • I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • I can use the outcome of test results to make predictions and set up a further comparative fair test. • I can report findings from enquiries in a range of ways. • I can explain a conclusion from an enquiry. • I can explain causal relationships in an enquiry. • I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. • Read, spell and pronounce scientific vocabulary accurately.

Key Competencies

IMPLEMENTATION

TOPIC OVERVIEW

Year Group	Autumn	Spring	Summer
1	Seasonal Change – Autumn and Winter Materials	Animals Including Humans Plants	Seasonal Change – Spring and Summer Animals including humans with a focus on minibeasts
2	Materials Monster! (Everyday materials) Healthy me! (Animals including humans)	Habitats and Animals (Living things and their habitats)	Young Gardeners (Living things and their habitats, plants).
3	Earth Rocks (Rocks and soils). Mirror Mirror (light).	Food and our Bodies (Animals including humans) How does your garden grow? (Plants)	Plants continued Opposites attract (Forces and magnets)
4	What's that sound? (Sound) Living things (Living things and their habitat.	Looking at states (states of matter). Teeth and eating (animals including humans)	Animals including humans cont – food chains Power it up (Electricity)
5	Out of this World (Earth and Space). Material world (Properties and change of materials)	Circle of life (Living things and their habitats, Living things including humans). Let's get moving (Forces)	Nutrition and healthy eating (cross curricular) Super scientists (scientists in the real world)
6	Classifying Critters (Living things and their habitats) Staying Alive (Animals including humans)	We are evolving (evolution and inheritance) Let it shine (Light)	Electrifying (Electricity)


Key Concepts
What are the links?
Key Activities
What are we doing?
Keys
Key Competencies
What are we learning and measuring?
Key Vocabulary
What are we hearing?

Year 1

Science – Autumn 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: -observe changes across the four seasons -observe and describe weather associated with the seasons and how day length varies.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest.	**Seasonal change** • I can observe and comment on changes in the seasons. • I can name the seasons and suggest the type of weather in each season.	**Seasons –** each of the four divisions of the year marked by particular weather patterns and daylight hours, resulting from the earth's changing position with regard to the sun. **Autumn -** the season after summer and before winter from September to November **Winter -** the coldest season of the year from December to February **Observe** – to look closely **Deciduous** - a plant that loses it leaves in autumn **Evergreen** – a plant that keeps its leaves all year round **Temperature –** the way of recording the difference in hot and cold by using a thermometer **Thermometer -** a device for recording the change in temperature	**1. How do we know it is Autumn?** Listen to 'Ferdie and the Falling Leaves.' Discuss the story and the signs of Autumn. Go on an Autumn walk around the school, observing and talking about what we can see. Children use a checklist to find signs of Autumn. **2. Why do the trees lose their leaves?** Introduce and discuss the difference between decid uous and evergreen trees and sort and compare the leaves. Children explore the school grounds for deciduous and evergreen trees. **3.How do we know the weather is colder?** Discuss different weather types on the daily weather chart. Introduce a thermometer and discuss what It is used for. Children to record and monitor the weather and temperature each day and record in a booklet. Compare the current temperature and weather types to that of Summer. **4. Why do we have different seasons?** Children to explore what happens in both seasons Autumn and Winter. Why is the weather colder and the days shorter? Children to make a class collage of the seasons Autumn and Winter and label the signs.

Science – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - distinguish between an object and the material from which it is made - identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock - describe the simple physical properties of a variety of everyday materials - compare and group together a variety of everyday materials on the basis of their simple physical properties.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest.	**Seasonal change** • I can name the seasons and suggest the type of weather in each season. **Everyday materials** • I can distinguish between an object and the material it is made from. • I can explain the materials that an object is made from. • I can name wood, plastic, glass, metal, water and rock. • I can describe the properties of everyday materials. • I can group objects based on the materials they are made from.	**Hibernation** – a period of time in winter when animals go into a deep sleep when food becomes scarce **Natural** - not made by humans. **Manmade** – made by humans. **Materials** - anything used for building or making something else. **Properties** - a characteristic of something. **Wood** - the hard material lying under the bark that makes up the trunk and branches of a tree. **Plastic** - an artificial substance made from certain kinds of chemicals that can be easily shaped when soft. Plastic is formed into many materials and products. **Glass** - a hard, clear material that breaks easily. Glass is used to make windows, bottles, mirrors, and the like.	**Seasons** **1. Why do we wear warmer clothes in winter?** Four children to dress up in certain clothes given. Class to identify which season each child is dressed up for. Children to then sort pictures of clothing into the correct category. **2. How do animals prepare for the Winter?** Children receive a box in the classroom – label on the outside says: 'Sssh hedgehog in hibernation'. Children to predict what the hedgehog is doing. Draw a map using a range of materials of animals and where they hibernate. **Materials** **3. What are things made from?** Explore the purpose of recycling – why is it important? What impact does it have? Children to work in groups and be assigned a material. Chn to hunt for that material around the classroom. Provide children with sticky notes and trays to label or collect objects. Is this material recyclable? **4. What is natural and man-made?** Children to look at items that are natural and man-made, identifying the differences and comparing them. Children to sort the pictures into the correct category. Can manmade and natural materials be recycled?

Science – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - distinguish between an object and the material from which it is made - identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock - describe the simple physical properties of a variety of everyday materials - compare and group together a variety of everyday materials on the basis of their simple physical properties.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest.	**Everyday materials** • I can distinguish between an object and the material it is made from. • I can explain the materials that an object is made from. • I can name wood, plastic, glass, metal, water and rock. • I can describe the properties of everyday materials. • I can group objects based on the materials they are made from.	**Properties** - a characteristic of something. **Investigation** – to learn facts about something that is hidden/unknown. **Prediction** – to make a sensible guess. **Conclusion** – the result of the investigation. **Waterproof** – something that does not let water pass through it.	**5. What are properties of materials?** Class feely bag, modelling and identifying properties. Create a class word bank highlighting vocabulary used. Children to find objects of certain properties and label them correctly. Children sort objects based on the material they are made from. **6. What material would make the best umbrella?** Children to investigate which material will make a good umbrella – what properties would it have to have?. Children to make predictions about the materials to test. **7. What material would make the best roof?** Children to test their materials and find out which materials are waterproof. Children to write a conclusion to the investigation identifying what they have found out.

Science – Spring 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: § identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals § identify and name a variety of common animals that are carnivores, herbivores and omnivores § describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) § identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Animals including humans** • I can name a variety of animals including fish, amphibians, reptiles birds and mammals. • I can classify and name animals by what they eat (carnivore, herbivore and omnivore). • I can sort animals into categories (including fish, amphibians, reptiles, birds and mammals). • I can sort living and non-living things. • I can name the parts of the human body that I can see. • I can link the correct part of the human body to each sense	Senses – feelings that parts of the body create to observe and understand the world around us. Mammals – a warm-blooded animal that has hair or fur and gives birth to live young. Fish – a cold-blooded animal that has gills and can breathe under water. Amphibians – cold-blooded animal that can breathe under water and on land. Reptiles – cold-blooded animals that have dry scaley skin. Birds – warm-blooded animal that has wings, feathers and a beak. Carnivore – animals that eat meat. Herbivore – animals that eat plants. Omnivore – animals that eat meat and plants.	**1. How do we change over time?** Children to look at baby photos and describe how they have changed over time. Draw an outline of a child and together identify and label body parts using sticky notes. Children to label the main parts of the body and identify other parts they know. **2. What are our five senses?** Children listen to sounds and identify what they can hear. Discuss what other parts of our bodies can do to help us. Children to match the parts of the body to the correct senses. **3. What do we use our senses for?** **Senses investigation** Children to explore their senses through a carousel of practical activities. **4. What animal group do we belong to?** Children to listen to the criteria for each animal group and identify which animal group we belong to. Children to list other animals that belong in this group. Children to discuss where the animals in each group live. Children to sort animals into land, sea or sky. **5. How are other animals grouped?** Game: T to describe an animal and children to guess what it is and what group it belongs in. Children to recall a fact about each animal group and draw a picture of an animal that belongs in the group.

Science – Spring 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: § identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals § identify and name a variety of common animals that are carnivores, herbivores and omnivores § describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) § identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Working Scientifically** • I can ask simple scientific questions. • I can use simple equipment to make observations. • I can carry out simple tests. • I can identify and classify things. • I can suggest what I have found out. • I can use simple data to answer questions	Senses – feelings that parts of the body create to observe and understand the world around us. Mammals – a warm-blooded animal that has hair or fur and gives birth to live young. Fish – a cold-blooded animal that has gills and can breathe under water. Amphibians – cold-blooded animal that can breathe under water and on land. Reptiles – cold-blooded animals that have dry scaley skin. Birds – warm-blooded animal that has wings, feathers and a beak. Carnivore – animals that eat meat. Herbivore – animals that eat plants. Omnivore – animals that eat meat and plants.	**6. STEM - What do animals eat?** **Animal poo experiment** As a class identify the three food groups. Children to investigate which food group each animal belongs to by exploring the contents of its poo.

Science – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - identify and name a variety of common wild and garden plants, including deciduous and evergreen trees - identify and describe the basic structure of a variety of common flowering plants, including trees.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Biology** I can name a variety of common wild and garden plants. I can name the petals, stem, leaf and root of a plant. I can name the roots, trunk, branches and leaves of a tree.	**Roots**: Are mainly below the soil. They soak up water and nutrients for the plant. **Stem**: Holds the plant up and carries water and nutrients from the root to the flower and leaves. **Leaves:** Catch sunlight to make energy for the plant. **Flowers:** Attract insects and birds.. **Petals:** Are usually bright and colourful. **Fruit:** Contains the plants seeds. Humans eat some seeds of some plants. **Seed:** They grow into new plants. **Bulbs**: Grow into new plants. Larger than most seeds. **Wild plants:** Grow where the seed falls. **Garden plants:** Plants that people choose to plant to make their garden attractive. **Weed:** A weed is often a wild flower that has grown where we don't want it to.	1. **Parts of a plant** Children to investigate different parts of a plant using magnifying glasses and trays. Children will create and label their own diagram of a flower using a range of materials. *Children to plant some seeds and keep a plant diary over the coming weeks.* 2. **Garden plants** Children to observe some garden plants and compare them talking about their similarities and differences. Children to create a drawing or collage of a garden using images from seed catalogues. Children to label the plants they know. *Children to discuss the progress of their plants and changes that have occurred so far.* 3. **British Science Week** *Life cycle of a plant* *STEM: Carnation investigation*

Science – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - identify and name a variety of common wild and garden plants, including deciduous and evergreen trees - identify and describe the basic structure of a variety of common flowering plants, including trees.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Biology** I can name a variety of common wild and garden plants. I can name the petals, stem, leaf and root of a plant. I can name the roots, trunk, branches and leaves of a tree.	**Roots**: Are mainly below the soil. They soak up water and nutrients for the plant. **Stem**: Holds the plant up and carries water and nutrients from the root to the flower and leaves. **Leaves:** Catch sunlight to make energy for the plant. **Flowers:** Attract insects and birds.. **Petals:** Are usually bright and colourful. **Fruit:** Contains the plants seeds. Humans eat some seeds of some plants. **Seed:** They grow into new plants. **Bulbs**: Grow into new plants. Larger than most seeds. **Wild plants:** Grow where the seed falls. **Garden plants:** Plants that people choose to plant to make their garden attractive. **Weed:** A weed is often a wild flower that has grown where we don't want it to. **Deciduous:** A deciduous tree loses its leaves each year. **Evergreen**: An evergreen tree remains green all year around.	4. **Wild plants** Children will go on a wild plant hunt. They will collect data on the most common type of plant they see growing in the school grounds. They will input this onto a pictogram. 5. **Parts of a tree** The children to observe and draw a tree. Children to compare the parts of a flowering plant to those of a tree. Children to label their pictures. 6. **Assessment** Children to complete a short quiz to show their understanding of the topic on plants.

Science – Summer 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - observe changes across the four seasons - observe and describe weather associated with the seasons and how day length varies.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Seasonal changes** • I can observe and comment on changes in the seasons. • I can name the seasons and suggest the type of weather in each season.	**Seasons –** each of the four divisions of the year marked by weather patterns and daylight hours, due to earth changing position. **Spring -** the season after winter and before summer, in which vegetation and new life begins. **Summer** – the season after Spring and before Autumn.	**1. How do I know it is Spring?** Children to go on a walk around the school with iPads and clipboards. Children to make observations, take pictures and draw signs of spring. **2. How does the weather change over time?** Children to record the weather during the week. Compare the two temperature booklets, one from Autumn and one just recorded for Spring. Discuss how day and night times change. **3. How do I know the seasons have changed?** Children to identify and compare the four seasons. Children to create a season spinner (wheel mechanism) to show their understanding of each season. **4. How are shadows created?** STEM investigation Children to recognise what a shadow is and how it is created. Children create a stick puppet and predict what would happen if it moves closer to a light source and what happens if it moves further away.

Science – Summer 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: - 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	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	<u>Working Scientifically</u> • I can ask simple scientific questions. • I can use simple equipment to make observations. • I can carry out simple tests. • I can identify and classify things. • I can suggest what I have found out. • I can use simple data to answer questions	Materials – what everyday objects are made from Sink – when an object is below water level Float – when an object is above water level Waterproof – when an object does not absorb water Investigation – when you carry out a test to find out something Minibeast – a small invertebrate animal Living things – things that are alive Non living things – things that are not alive Tally – a score or amount Research – creation of knowledge that you have found through an investigation	**1. Material STEM investigation** Chn to investigate which material is best to make a house for the three little pigs. Chn make their own house structure and test it out with a hair dryer to see if it will blow down. **2. Material STEM investigation** Chn to investigate what material is best to make a raft for the Billy Goats Gruff to use to cross the river. Chn to make their own raft and test it out to see if it will sink or float and how much weight it can take. **3. What is the difference between living and non-living things?** Use images to identify living and non-living things and write them in a list. Chn sort pictures into the correct catergory. **4. What is a minibeast?** Chn to identify what a minibeast is and name minibeasts they know. Chn to take part in a mini-beast hunt around school. Create a tally chart to record their observations and answer questions about the results. **5&6. How can I find out more about minibeasts?** Chn to choose a minibeast to research further. Use iPads, chrome books and books to research. Chn to include diagrams, facts, observations and data. This will be presented as a mini booklet.

Year 2

Science Materials, then and now! – Autumn 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: **Materials** -Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Working scientifically**- asking simple questions, observing closely, identifying and classifying, using observations to suggest answers to questions, gathering and recording data.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	I can identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard. I can classify and compare materials based on their characteristics. I can explain the meaning of scientific vocabulary I can justify why a material might or might not be used for a specific job and explain my reasoning. I can make a prediction before carrying out a test I can explain how shapes can be changed by squashing, bending, twisting and stretching. I can compare materials and their suitability (past and present London buildings) Working scientifically: - To perform a simple test. - To ask simple scientific questions. - To suggest what I have found out. - To use simple data to answer questions.	Questions Equipment Prediction Fair test (variables) Method Diagram Observations Results (present and record data/measurements) Conclusion Hard Soft Smooth Flexible/Bendy Transparent Opaque Waterproof Strong Brittle Absorbent Smooth Rigid Fair test Investigate Fabric Metal Wood Ceramic Clay Glass Sand Rock Brick Stone Natural Man-made	**Predict-What is our new topic? Prior** learning-what do children know about materials? Show children a range of materials. Can you predict what topic is about? Create group and class thought shower to show what children already know about materials? (Children struggled with this) Mind-map in curriculum book-children draw and annotate what they already know. **Can you name everyday materials?** The children will have the opportunity to identify different items in the classroom and what they are made of. Have a variety of literal materials in classroom, children to practically sort and label them. Can children group the materials, into hoops and then explain their reasoning? Challenge and questions children's choices. (E.g.-are any of the materials man-made?) Identify and name a variety of everyday materials, including wood, plastic, glass and metal. Would glass be a good material for a water bottle carrier? **What are properties of materials?** Revisit vocab-properties of materials from Y1. Introduce more challenging vocab-ask children what opaque, transparent, flexible, rigid, waterproof, absorbent mean? Give children actions and examples and time to explore the definitions of these words-use widgit symbols. Give children a range of materials-exploring different textures. Children to group them independently first-encourage children to explain their choices. The children will begin to understand how to classify materials based upon their characteristics. The children will develop vocabulary actively, building systematically on current knowledge. Justify ideas with reasons, moving from group work to individual work-can children classify the materials using new vocabulary? Ask and scribe in books-How did you classify the materials? How could you describe the materials in the groups? Extension-why are bricks not a suitable materials for windows? Encourage higher level vocab to explain-model how to use this. **Can materials change shape?** Revisit vocab from previous lesson in class quiz**.** Discuss the meaning of fair testing with children. Children to predict which materials they think will be changeable-encourage children to explain their reasoning. Children to work in groups to experiment with a selection of materials on table-which materials can be twisted, pulled etc? Chn to make predictions first, then record their results in a simple table and discuss their findings. Extension activity- Why do you think metal is often used to make cutlery? "As much use as a chocolate teapot". Would a chocolate teapot be useful? Explain your reasoning. **How have building materials changed? (iInk to DT lesson)** Discuss how the fire spread through Pudding Lane by showing the children this video. Discuss how the houses were built in 1666 and what properties are needed for a roof. Evaluate the stability of Tudor buildings by creating 3D models (in DT) 2D collages and labelled diagrams Look at buildings from today. Comparison between old and new building materials. If you were to redesign London after the fire, which materials would you have chosen and why? Practical lesson. Assessment opportunities-Vocab quizzes, pupil conferencing, recording children's verbal responses in books. Assessment quiz at the end of topic.

Science Materials, then and now! – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: **Materials** -Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Working scientifically**-asking simple questions, observing closely, identifying and classifying, using observations to suggest answers to questions, gathering and recording data. They should use simple features to compare materials and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	<u>AT2- Lesson 1</u> I can investigate why a material might or might not be used for a specific job. I can make a prediction before carrying out a test I can perform a simple test. I can suggest what I have found out. <u>Lesson 2:</u> To find out about people who have developed useful new materials. I can describe Charles Macintosh and his famous invention. To formulate ideas about unusual and creative uses for everyday materials. <u>Lesson 3:</u> I can explore where materials come from. I can observe how materials change over time. I can compare materials and their suitability (past and present London buildings)	Wattle Daub Building method Effective Hard Soft Smooth Flexible/Bendy Transparent Opaque Waterproof Strong Brittle Absorbent Smooth Rigid Fair test Investigate Fabric Metal Wood Ceramic Clay Glass Sand Rock Brick Stone Natural Man-made	Assessment opportunities-Vocab quizzes, pupil conferencing, recording children's verbal responses in books. Assessment quiz at the end of topic. <u>What is wattle and daub?</u> Children work with a partner to investigate how wattle and daub was used as a traditional building method in the past. Discuss how the fire spread through Pudding Lane by showing the children this video. Children to mix water, soil, clay, straw together and build a structure out of sticks. Using the daub to cover the structure-was this an effective building method? Predict, what will happen when the mixture dries? Why do you think animal dung was used in 1666? Compare to joining materials now. <u>Which materials would be best to make a fire bucket?</u> Recall knowledge of materials learned in Autumn 1 using quizzes and verbal responses. (Children will have prior knowledge of different materials and their properties). Discuss how leather buckets filled with water were used in 1666 to put the fire out. Do you think leather would have been a good material to use for a bucket? Why? Introduce the word 'waterproof.' Do you think a bucket would need to be waterproof? Provide the children with the following materials; a plastic bag, fabric. Metal and cardboard. Which materials would you use to create a bucket? Encourage children to investigate whether each material is waterproof and record their results in their books. After the experiment ask children; which material would be best for a modern-day fire bucket? Why? <u>Who developed useful new materials?</u> Discuss the findings from the waterproof experiment in the previous lesson. Which materials would you wear in the rain? Who invented the raincoat? Introduce Charles Mackintosh, providing each table with facts to discuss in groups and share with the class. Can you create a factfile about Mackintosh's invention? Next step: If you could create a new material what would you create? What properties would it have? What would it be used for? <u>Where did the material come from?</u> In History we have been learning about houses in 1666. What were they made out of? What is Wattle and daub made from? The children can have a go at creating their own wattle and daub using sand, clay, soil, straw exploring how to join the materials. Once they have created their wattle and daub practically, they can begin to observe how the material changes over time by noting the properties of the material after they have created it and revisiting it the next day to observe how it has changed. Now that you have made wattle and daub, do you think it would be suitable to build a house out of the material? Why/ why not? What would you use instead?

Science Materials, then and now! – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: **Materials** -Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. **Working scientifically**-asking simple questions, observing closely, identifying and classifying, using observations to suggest answers to questions, gathering and recording data. They should use simple features to compare materials and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	<u>Lesson 4:</u> To ask simple scientific questions. I can explain how shapes can be changed by squashing, bending, twisting and stretching. To suggest what I have found out. <u>Lesson 5:</u> I can justify why a material might or might not be used for a specific job and explain my reasoning. I can design a pair of gloves for Santa using my knowledge of materials and their properties.	Questions Equipment Prediction Fair test (variables) Method Diagram Observations Results (present and record data/measurements) Conclusion Hard Soft Smooth Flexible/Bendy Transparent Opaque Waterproof Strong Brittle Absorbent Smooth Rigid Fair test Investigate Fabric Metal Wood Ceramic Clay Glass Sand Rock Brick Stone Natural Man-made	<u>Research a material</u> Children to choose a material and find out as much as they can about it. Leave out the following materials; card, fabric, metal, paper towel, playdough, wool, clay, cotton wool, leather, paper, plastic, wood. Thus is important as some children have an aversion to touching materials e.g cotton wool. Ask children what they would like to find out. Provide sentence stems to support. If a child chooses cotton wool their questions might include: How much cotton wool can fit in a yoghurt pot? Is cotton wool waterproof? Will cotton wool go back the way it was after it is wet? If I stretch all the bits of cotton wool out, how long will it be? Who invented cotton wool? Ask children to look at their questions and think about if there is a question they could test. For example, if they chose elastic bands, have they asked 'which is the most stretchy?' Or if they chose fabric, would they like to find out which things would stain the carpet e.g ink, coffee, tea, water, mud. Create a carosel of experiments for the children to explore and carry out their own investigation. The children can then share their expert knowledge and findings with the class. Allow children to decide how they want to share their findings e.g mini book, leaflet, poster, video clip or a hot seat activity. **<u>Winter experiment-</u>** Several parcels of mystery items have been delivered! How can they tell what's inside without looking? Some methods they could use: • feeling • observing • listening • Smelling All the objects have something in common. They are materials called fabrics that we use for making different types of clothing. Which fabrics would they wear on a warm day, a cold day or a rainy day? Why do they think this? Has this changed what they think is in the bag and if so, why? Reveal the items in each bag one at a time. Extend children's' thinking with more probing questions about the materials: can the children explain which fabrics to avoid in different weather conditions? Such as how cotton would absorb water easily and become heavy and uncomfortable in wet weather, or how wool would trap the heat on a warm, sunny day and cause you to sweat. Children could use a list of words to look for in the labels of their own clothes, e.g. wool, acrylic, cotton, polyester. Using what you have found out about materials, **Can you design a pair of gloves for Santa? What materials would you use? Why?** <u>Keep out the cold - Explorify</u>

Science – (What do humans need to survive?) – Spring 1

NC PoS	Key Concepts	Key Competencies	Vocabulary	Activity
Pupils should be taught: -To find out about and describe the basic needs of animals, including humans, for survival (water, food and air) - To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	Biology: - To describe why exercise, a balanced diet and good hygiene are important for humans. -To describe what animals and humans needs to survive -To explain the basic stages in a life cycle for a human (and animal) Working scientifically: - To perform a simple test. - To ask simple scientific questions. - To suggest what I have found out. - To use simple data to answer questions. • find out about and describe the basic needs of animals, including humans, for survival (water, food and air) • describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene	**Exercise:** Moving parts of the body to become stronger and healthier. **Healthy:** Feeling well and happy. **Flexible**: capable of bending easily without breaking. **Happiness**: is a sense of well-being, joy, or contentment. **Hygiene:** The things we do to keep our body clean and help stop the spread of germs. **Germ:** Germs are tiny living things we cannot see with our eyes. They can live on our bodies, and can cause disease. **Carbohydrates-**energy **Protein**-Building the body (for example muscles, skin, hair, nails) and repair **Fats**-Energy and insulation Skin health and brain health **Hygiene**: The things we do to keep our body clean and help stop the spread of germs **Senses – to smell, taste, look at, listen to and touch** different ingredients **Eatwell Plate**-The Eatwell Plate explains that different foods help our bodies in different ways **Hygiene**: The things we do to keep our body clean and help stop the spread of germs **Germs-**refers to the microscopic bacteria, viruses, fungi that can cause disease. **Washing hands** well and often is the most important thing your family can do to prevent **germs** **Sneeze-**make a sudden involuntary expulsion of air from the nose and mouth Human Life Cycle Vocabulary germs, unwell, illness, exercise, diet, healthy, balanced, rest, fight, bacteria, spread, wash, clean	**Lesson 1 – Introduction to the Topic Learning Log Entry Quiz Sheet.** **What is a human>** How do humans change during their lifetime? - BBC Bitesize Discuss what a human is-record children's responses. What do they already know. Create timeline fo human life cycle. **Does happiness help to keep you healthy?** Keeping healthy is not just working with children about fitness, diet and hygiene, but also about supporting children in developing their understanding that having positive relationships, being happy and free from worry (stress). We need to take care of our body and our minds. Ask children to think about what makes people happy. You could also encourage children to share responses and talk about how our bodies and minds feel when we are happy.(Annotate an outline of a person) **How can I help my body and keep fit?** Let's get physical - Explorify Spark a conversation with this sound clip of an athlete hard at work. This activity is great for describing observations and applying ideas in unfamiliar contexts. What are the different ways that we can keep fit? Make a class pictogram (Following on from creating pictograms in computing) about their favourite sport. Watch the video Animation about the role of the heart from www.aboutkidshealth.ca and discuss the role of the heart and how exercise affects the heart. **Is sleep important?** Discuss why sleep is important and ask the children how much sleep they think they need. What happens when you don't get enough sleep? Link to mood, weight gain, restlessness, anxiety. How can we sleep better? Discuss bedtime routines e.g. having a bath, brushing teeth, removing technical devices from bedroom/away from bed, sound machine, going to bed earlier, reading a book in bed, fresh pjs etc (Dream catchers in DT). Explore question-what if humans hibernated? Humans hibernated? - Explorify **What is a balanced diet for us and the planet?** 1. Plan an investigation around a Big Question. What do the pupils already know about what makes a diet balanced for themselves and our planet? • What do we need to eat for a healthy balanced diet? • Where does our food come from? • How is it produced? • What food items should we eat sparingly? • Which foods are sustainable? 2. How will the group explore the question? Prompt pupils to explain their ideas, qualify them and refine them based on views expressed by other people. What is their plan for the investigation? 3. Ask the class to imagine they had to present their investigation at a school assembly or to their family, how would they show their action plan?

Science – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: -To find out about and describe the basic needs of animals, including humans, for survival (water, food and air) - To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	To explain if something is alive, dead or was never alive and know the things animals need to survive To understand what the seven life processes are and how to identify if something is dead or alive. To describe how a specific habitat provides for the basic needs of things living there. I can identify and name plants and animals in a range of habitats and match living things to their habitat. To identify living things which live in habitats Working scientifically: - To perform a simple test and make observations on a butterfly's life cycle. - To ask simple scientific questions about different animals and their development. - To suggest what I have found out. - To use simple data to compare life cycles and answer questions.	Living Non-living Water, food, air, shelter MRS GREN Movement, respiration, sensitivity, growth, excretion, reproduction, nutrition Habitat-a natural environment or home of a variety of plants and animals Micro-habitat-a very small habitat, for example for woodlice under stones, logs or leaf litter Habitats -Human, Coastal, Forests Woodlands, Grassland Marine, Polar, Desert Adult: A fully grown animal or plant. Develop: To grow and become stronger Life cycle: The changes living things go through to become an adult. Offspring: The young of an animal. Reproduce: When living things make a new living thing of the same kind – (E.g. cats have kittens Young: Offspring that has not reached adulthood. Live young: Offspring that has not hatched from an egg. Hatch: Break out of a shell.	**Lesson 1: How can I tell if something is alive, dead or was never alive?** Begin the lesson with a Learning Log Entry – What do we already know about animals and their habitats? Introduce children to the concept of MRS GREN. All children to classify and sort things into alive, dead and never alive. (Sorting hoops with table groups). Chn to have a series of more challenge pictures that they must explain why they know they are either alive or dead, referring to the seven life processes. Explore questions...is a flame alive? Is a deciduous tree dead in winter? Ask children to prove how they know and encourage debate **Lesson 2: What is a habitat?** Thorny issue - Explorify Look at a variety of habitats from the UK familiar to the children (woodland and city/town). Children to explain to a partner and jot down initial thoughts-what is a habitat? Initial assessment activity prior to teaching-can the children match the animals and plants correctly to the habitats? Ask children to compare and contrast organisms that live in British woodlands and urban environments. The children must identify how the animals are suited to the environment and begin to discuss finding food and food chains. **Lesson 3:(British Science Week 18th March – Theme of Growth) To use simple equipment to make observations and carry out tests** BSA_BSW_pack_primary_full_1121v16.pdf (britishscienceweek.org) Children to be introduced to our experiment – watching a butterfly grow and it's life cycle from an egg to a butterfly. Each class will have a net and a set of eggs. They will raise butterflies then release them to nature in a couple of week's time. They will also complete an activity that shows the correct ordering of the life cycle and what a butterfly needs to grow. **Lesson 4: How do animals get their food?** Muddy meal - Explorify Look at simple food chains and sources of food. Can children investigate using QR codes what the words herbivore, carnivore and omnivore mean? Once discussed meanings as class, children to research and explore how a range of different animals find their food. Children to create habitat collages to demonstrate their learning. Children to record the steps of a simple food chain in curriculum books, one that includes a human and one that doesn't include a human. (e.g. grass, cow, human). Pose question-will all humans food chains be the same? Encourage children to think about vegetarians. **I can compare and contrast habitats and animals in the UK and in Africa** Trip to WIld Zoo-hcn take part in African animal workshop. **Lesson 5: I can evaluate my learning journey.** Children to complete a Learning Log Exit activity to share what they have learnt about animals and their habitats.

Science – Summer 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: To understand how properties of materials relate to how they are used. To ask simple scientific questions. To use simple equipment to make observations. To carry out simple tests.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	To know the difference between materials and objects. To know how to describe their properties and suitability for different uses. Working scientifically: - To perform a simple test. - To ask simple scientific questions. - To suggest what I have found out. - To use simple data to answer questions.	Material Properties Suitability Float Fair test Plastic Card Foil Tin Test Boat Predication Observation Surface Water Result Findings Sink Fly Parachute	**Boat Investigation – linked to Grandad's Island** Test a variety of different materials to see if they sink or swim. Make predictions first. Then children to make boats using card, plastic or foil. Which boat was more suitable to holding the everyday items and why? What materials would you choose next time? Record their findings and evaluate their predications. **Parachute Investigation – linked to History Flight Topic** How can I make things fly? Hook – https://www.youtube.com/watch?v=vZYwsAvHgVw Explain to the children that they are going to make some paper parachutes and carryout an investigation with them. Demonstrate how to make the parachutes and show the children how they work. Show the children different sized parachutes and ask them what could we investigate about these? Allow the children time to discuss this then encourage/guide them to come up with a simple scientific question – does a larger parachute fall more slowly than a smaller parachute? How will it be a fair test? - Add the same weight to each parachute - Drop from the same height - Drop at the same time What are you going to change? Size of parachute Ask the children to make a prediction first. Main Activity – working in groups of 2 the children should each make a small and large parachute.. They should them carryout the test. One child could record this using an iPad. Evaluate findings. What did the children observe? What have they found out?

Science – Summer 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught: -To find out about and describe the basic needs of animals, including humans, for survival (water, food and air) - To describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	I can identify and name a variety of plants. To observe and describe how seeds grow into mature plants. To find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. To use data and experience from growing seeds to explain how to improve the growth of their plants. To ask questions about plants, use data to describe what a plant needs to grow. name vegetable plants, herbs and flowers. describe how a seed germinates. I can describe the life-cycle of a plant, **Working scientifically:** To ask simple questions and recognise that they can be answered in different ways. To observe closely, using simple equipment. To perform simple tests. To identify and classify. To use observations and ideas to suggest answers to questions. To gather and record data to help in answering questions Time lapse plant growth www.youtube.com/watch?v=fPTJ3qD1ikk www.youtube.com/watch?v=LICDb8nM5rs www.thekidshouldseethis.com/post/18800462609	t is assumed that most children know, from their Foundation Stage experience, words such as, plant, soil, vegetables, although they might not know how to write and spell them Bulb: The round underground part of a plant that contains food for the plant Germinate: This is when a seed begins to grow, Seedling: A young plant which has just started to grow (from a seed) Root: Stem: The stem is usually the upper part of the plant and it can have branches, leaves and flowers.. Sunlight: - All plants need light from the sun. Some plants need more than others. Water: All plants need water to grow. Without water, seeds and bulbs will not germinate. Temperature: Temperature is how warm or cold it is. Some plants like hot temperatures, while others prefer cooler temperatures. Seed dispersal: When seeds are ready to leave the plant, they are dispersed by the wind or animals to a different place to settle and grow.	**Plants-What plants do we have at Peters Hill?** -Take children on a plant hunt around school to assess children's knowledge and understanding of plants. Can they name the basic features of a plant, can they recognise and name common plants? What do plants need to survive? Why do we have plants? What basic things do plants need to survive? Baseline. Revision from Year 1 The parts of a plant - BBC Bitesize **Why don't all plants look the same?** Why don't all plants look the same? - Explorify Encourage your class to explore plants close up with hands-on activities, examining with hand lenses, taking plants apart, and piecing them back together. Pair this with labelling activities and children will soon know the names of the different plant parts. Plan an investigation around a Big Question. What do the pupils already know about the similarities and differences in the appearance of plants? • Do similar size plants grow from similar size seeds? • Do different plants like to grow in different places? • Do all plants have flowers? **Why do some plants have seeds? What is the lifecycle of a plant?** Explorify (wellcome.ac.uk) Which is the odd one out? Can children explain their reasoning then match the seeds to the common plants? Children to look at pictures of fruit, veg growing and predict what it will be when it is fully gorwn. Justify their reasonings. Children to then create a life-cycle of a plant using animation software on Purple Mash. The lifecycle of a plant - BBC Bitesize **How do plants change and grow over time?** Linked to work in Jack and the Beanstalk, children to plant their own beans. What do plants need to grow? Discuss and look at different conditions. Observe change over time-using bean diaries. Once a week/every few days ook at beans, observe and note any changes, and record how long the bean plant is in bean diary. Children create their own cress heads-experiement changing different variables (no light, no water etc). Can cress grow on cotton wool? Predict. If so, how? **What plants do humans and adults eat?** Explore. How do we know which plants to eat.

Year 3

Science – Rocks and Soils – Autumn 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter	Children will work collaboratively and independently to investigate scientific concepts Children will develop a knowledge of a range of scientific vocabulary and will be able to use them in context.	Year 2 Revision I can explain different sources of food for their animals. Rocks and soils fit into curriculum pathway 2 – Chemistry. To compare and group rocks based on their appearance and physical properties, giving a reason. To describe how fossils are formed. To describe how soil is made. To describe and explain the difference between sedimentary and igneous rock.	**Mineral:** natural substances that are the 'ingredients' of rock. **Rock:** made from one or more minerals. **Permeable:** allows water to pass through. **Impermeable:** doesn't allow water to pass through. **Crystals:** minerals that join together to make igneous rock. **Ore:** rock or mineral that contains metal. **Igneous rock:** rock formed from magma or lava. **Magma:** hot liquid rock below the surface. **Sediment:** small bits of rock. **Sedimentary rock:** rock made from sediment. **Humus:** part of soil made from dead plants and animals – gives soil a dark colour. **Fossil:** the remains or impression of a prehistoric plant or animal. **Extinct:** means the plant or animal is no longer alive on the Earth or hasn't been seen for over 50 years. **Palaeontologist:** a fossil scientist. Names of some rocks, e.g. **granite**, **marble**, **limestone**, **sandstone, basalt, slate, pumice**	Initially, the children will complete a quiz (in learning logs) to help teachers discover the existing knowledge. 1. Are all rocks the same? Children will investigate a selection of rocks . Initially predicting, then comparing their hardness, discover whether they are permeable, and if they float and, using a magnifier, their observable features. Children will begin to compare the properties they have discovered abd classify them into groups. 2. How is sedimentary rock formed? Investigate how sedimentary rock is formed – first by watching a bottle fill with layers of sediment, then by creating their own sedimentary sandwiches! They will relate the layers of food to the layers of sediment which are washed downstream using a 'story'. How are fossils formed? 3. The children will investigate how fossils are formed by initially constructing their own imprint fossil in plasticene, then they will observe how the imprints are filled with liquid rock using filler which will harden quickly. Children record their work by completing a story board. 4. How is igneous rock formed? Children watch 3 types of chocolate melting and see how they mingle to create a different type of chocolate. This is similar to how lava and magma create lots of different igneous rock. They then relate this information, and that that they have discovered about sedimentary rock, to complete a true/false questionnaire about the rocks they have investigated. 5. How is soil formed? Children listen to a story or Roger Rock and apply the ideas to the knowledge they have formulated during the topic. They begin to relate the ideas to how soli is created and produce a story board which demonstrates how soil is made.

Science – Rocks and Soils – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: Rocks • recognise that soils are made from rocks and organic matter. Light • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change.	Children will work collaboratively and independently to investigate scientific concepts Children will develop a knowledge of a range of scientific vocabulary and will be able to use them in context. Children will begin to recognise how scientific concepts relate to their everyday lives.	Year 2 Revision I can explain different sources of food for their animals. Rocks and soils fit into curriculum pathway 2 – Chemistry. • To describe how soil is made. Light, fits into the curriculum pathway 1 – physics. • I can describe what dark is (the absence of light). • I can explain that light is needed in order to see. • I can explain that light is reflected from a surface. • I can investigate and demonstrate how a shadow is formed. • I can explore shadow size and explain. • I can explain the danger of direct sunlight and describe how to keep protected.	**Sediment:** small bits of rock. **Sedimentary rock:** rock made from sediment. **Palaeontologist:** a fossil scientist. **Dull:** a surface that scatters light and does not look shiny. **Shiny:** surfaces that reflect lots of light. **Reflect:** to change the direction of light using a shiny surface. **Mirror:** a shiny polished surface. **Observation:** what we see happening in a scientific test. **Explanation:** a sentence (or sentences) giving a reason for something happening. **Light source:** the place where light originates from. **Shadow:** darkness caused by light being blocked. **Transparent**: letting most or all light through. **Translucent**: letting some light through. **Opaque:** not letting light pass through.	1. Children listen to a story or Roger Rock, who ends up as part of Simon Soil and complete a story board which demonstrates how soil is made. 2. End of topic activity and learning log. 3. Learning Log for beginning of new topic. Then introduction to what darkness actually is. Children are given sealed boxes which contain items taped to the bottom. Can they see them? They then reveal one hole at a time and again look into the box each time discussing what they can see. Eventually, the children will see most items in the direct rays of light. Only when enough light is shining on the items, can the objects be seen. 4. Children investigate and compare how much light is reflected off a range of coloured papers. They then discover how we see things only when light is reflected from it. They the label pictures to show the light direction from a light source to an object and back to our eyes. Finally, children investigate how they can use mirrors to 'bend light' to shine on an object. 5. Children investigate how shadows are formed by comparing the shadows made by a range of different materials. They are reminded of the terms, opaque, translucent and transparent 6. Children investigate what happens to shadows as the light sources is moved away from the object causing the shadow. They predict before testing, then compare their results and explain their results using their knowledge. 7. Learning log

Science – Animals including humans – Spring 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement. • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. • Identify differences, similarities related to simple scientific ideas and processes.	Children work collaboratively and independently to investigate scientific concept. Children develop an extensive knowledge of a range of scientific vocabulary and are able to use them in context. Children begin to recognise how scientific concepts relate to their everyday lives.	Year 2 Revision I can explain different sources of food for their animals. **<u>Pathway 3 – Biology</u>** • To analyse and explain the importance of a nutritious, balanced diet • To classify animals according to their dietary needs. • To explain what is meant by 'a healthy diet'. • To investigate and describe the purpose of the skeleton in humans and other animals. • to discover and explain how the muscular system helps us to move. **<u>Pathway 4 – Working scientifically</u>**	**Nutrients:** useful substances found in foods. **Protein:** nutrients found in foods such as fish, used in your body for growth and repair. **Fats:** nutrients found in foods such as butter. Give you energy and insulate your body. **A balanced diet**: a diet that has the right amount of nutrients. **Carbohydrates:** nutrients found in sugary foods such as sweets or starchy foods such as potatoes and pasta. Give you energy. **Skeleton:** supports and protects the body, allowing us to move. **Vertebrates**: Animals with a back bone (internal skeleton) **Invertebrates:** Animals without a back bone. **Exoskeleton:** a skeleton that some animals have which is outside their bodies like a suit of armour. **Femur:** the long bone at the top of our legs. **Humerus:** the long bone at the top of our arms. **Contract:** when a muscle gets shorter and pulls. **Relax:** when a muscle stops contracting. **Muscle:** special organs which can contract and make our bodies move. **Joint:** where bones meet. There are different types of joint that can move in different ways.	1/2 Begin with initial assessment of earning using learning log activity. Children discuss the meaning of the scientific term 'diet' , they identify the main food groups, match them initially to common foods, then to the main nutrients and finally to the way in which the human body uses these nutrients. 3. Children discuss the terms, omnivore, herbivore and carnivore, they then use the internet to find animals belonging to each group. 4/5. Children discuss what they know of their own skeletal system. They watch videos which demonstrate the purpose of their own – and those of other animals. They label some of the main bones. They also learn that other animals have an exoskeleton or no skeleton at all. They match animals to their skeleton shapes and sort animals according to skeletal types. They explain how skeletons give bodies shape, support, give protection and, working with our muscular system, allows movement. They begin an investigation about whether someone with a longer femur can jump further. 6. Children conclude their femur investigation.

Science – End of Humans and other animals and beginning of Plants – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Working Scientifically setting up simple practical enquiries, comparative and fair tests making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, recording findings using simple scientific language - 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, using straightforward scientific evidence to answer questions or to support their findings. **Biology** explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant investigate the way in which water is transported within plants	**For children to develop an <u>enquiring mind</u> and desire to <u>independently investigate</u> and <u>research</u> scientific areas of interest.** **For children to be able to work scientifically in order to investigate, using scientific principles.**	NB This investigation has been carried forward from Spring 1 as insufficient time was available to provide a quality experience. **<u>Working scientifically</u>** • I can ask simple scientific questions. • I can carry out simple tests. • I can suggest what I have found out. **<u>Biology</u>** • To explore and describe the needs of different plants for survival. • To explore and describe how water is transported within plants.	Fair test Investigate Prediction Results Conclusion Measure Standard Units Stem: holds the plant upright and supports the leaves. Contains tubes that allow water to travel from the roots to the rest of the plant. Veins: tubes in the leaf that carry water and food.	1. Children begin an investigation - Can people with longer femurs jump further? They begin by discussing their thoughts and then make a prediction of the outcome. The children then think about how they can make the test fair. What needs to stay the same and what will be measured. They set up the charts to record the results. The test is completed in PE. 2. The children then look at the results and consider what they show us. Do they help us to answer our question? Discuss possible improvements and other possible questions that we could investigate. 3. Revision of learning then learning log. 4. New 'plants' learning log. 5. British Science Day 18th March – Investigations and practical science based on growth – Investigation about conditions for healthy growth in plants/seeds. Children investigate the purpose of the stem in a plant by watching how coloured water is drawn up a stalk of celery.

Science – Plants – Summer 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	Biology Key Learning Objectives • I can describe the function of different parts of flowing plants and trees. • I can explore and describe the needs of different plants for survival. • I can explore and describe how water is transported within plants. • I can describe the plant life cycle, especially the importance of flowers.	**Root:** helps anchor the plant into the soil. Takes up water and nutrients. **Stem**: holds the plant upright and supports the leaves. Contains tubes that allow water to travel from the roots to the rest of the plant. **Flower**: the part of the plant where seeds are made. **Leaves:** catch sunlight and use this to make food. **Veins:** tubes in the leaf that carry water and food. **Germinate**: when a seed starts to grow and produce a root and shoot. **Pollen**: dust-like powder made in the stamen of a flower. **Pollination**: moving the pollen from the stamen of one flower to the stigma of another. **Ovary:** the part of the flower that contains the ovules. **Sepals**: protect the rest of the flower as it grows. **Stamen**: the male part of the flower produces pollen – made up of anther and filament. **Carpel/pistil**: female part of the flower – made up of stigma, style and ovary. **Stigma**: part of the carpel that pollen grains attach to during pollination. **Style**: the middle part of the carpel, connecting the ovary to the stigma. **Ovule**: these are like eggs – they develop into seeds. **Petal:** part of the flower which attracts insects often brightly coloured.	1. Children think about what we mean by a flowering plant, then watch a video to discover what each main part of a flowering plant does. They then label a diagram and explain what each part does. 2. Children discuss what they think plants need to survive. They turn these thoughts into questions that can be investigated using scientific methods of investigation. They set up, predict outcomes and record how they have set up their investigation. 3. Check up on what is happening with our investigations then remind children of the parts of a plant and discuss which part carries the water around the plant. We will investigate which stem takes up the water more quickly and consider the reasons why. 4. Continue to check on the development of our investigation. Children will dissect a flower and discover the importance of the flowers in the life cycle by finding out about the parts. They will produce a three d card flower for their report folders and explain what each part does. 5. The children will find out the final results of their plant investigations and record their results and conclusions. 6. After half term – children will complete their learning logs.

Science – Forces Page 1 – Summer 2

NC PoS	Key Concepts Link	**Key Competencies**	Vocabulary	Activity
Children are taught to… compare how things move on different surfaces notice that some forces need contact between two objects, but magnetic forces can act at a distance observe how magnets attract or repel each other and attract some materials and not others	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of science.	**Pathway 1 – Physics** **Forces** • I can explore and describe how objects move on different surfaces. • I can explain how some forces require contact and some do not, giving examples. Friction Different surfaces create different amounts of friction. The amount of friction created by an object moving over a surface, depends on the roughness of the surface and the object, and force being placed upon the object. Forces Forces change the speed direction or the shape of an object.. They can make things speed up, slow down and even stop!	**Force:** a push, pull, twist or turn caused when two objects interact with each other. **Friction**: a force that acts between two surfaces or objects that are moving – or trying to move - across each other. **Magnet:** an object that attracts iron or another magnetic material. **Contact:** touching.	1. Children complete final learning log from Summer 1. 2. Do new learning log for Forces and investigate how objects move on different surfaces. Children given some equipment and are challenged to discover which surface allows them to move more easily. (not recorded. Due to time constraints) 3. Children visit The Think Tank and take part in a ‘forces’ workshop. 4. Children watch videos involving gravity and magnets. They discover that some forces do not require physical contact, while others do. They create lists of forces which do/do not require contact and explain what some of those forces are.

Science Page 2 – Summer 2

NC PoS	Key Concepts Link	**Key Competencies**	Vocabulary	Activity
compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing.	• I can explore and explain how objects attract and repel in relation to objects and other magnets. • I can predict whether objects will be magnetic and carry out an enquiry to test this out. • I can describe how magnets work. • I can predict whether magnets will attract or repel and give a reason.	<u>Magnets</u> • I can predict whether materials will be magnetic and carry out an enquiry to test this out. • I can describe magnets as having two poles. • I can predict whether magnets will attract or repel another magnet and explain the reason. <u>Key knowledge</u> Magnets attract metals containing iron. They repel 'like' poles and attract opposing poles.	**Attract:** pull towards. **Repel:** push away. **Magnetic:** attracted to a magnet – Contains iron, nickel or cobalt. (Not all metals are magnetic.) **Non-magnetic:** not attracted to a magnet. **Iron:** a metal that can be made into a magnet. **Pole:** the area of a magnet where the magnetic force is strongest. **Magnetic North:** the direction of the Earth's magnetic North pole. **Compass:** a device that aids navigation by pointing to the Earth's North and South poles. **Prediction:** what you think might happen in a scientific test.	5. Children initially predict whether different materials are magnetic and then test, recording their results in a simple table. They discuss the results together to support their understanding that not all metals are magnetic. 6. Children investigate the poles of a magnet and their reaction to each other, recording the results using labelled diagrams. 7. Children use their knowledge of 'fair test' procedures to investigate the strength of different magnets. They are encouraged to look at and choose from, a range of different testing procedures and to choose their own investigative procedure, recording their prediction, method , results and conclusion.

Year 4

Science – Autumn 1

Key Question - Are all living things breathing?

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: 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 and wider environment, recognise that environments can change and that this can sometimes pose dangers to living things.	Pathway 3- Biology **Curriculum concept: For children to research scientific areas of interest.** **Quiz type based learning logs and beginning and end of unit.** **Children begin to recognise how scientific concepts relate to their everyday lives.**	<u>Y3 Recap</u> LO: To explain the muscular system of a human. LO: To argue the advantages and disadvantages of wind farms. <u>Y4 Learning</u> 1. LO: I can identify and explain the characteristics of living things. 2. LO: I can recognise and group living things in different ways and justify my choices. 3. LO: I can use classification keys to group, identify and name living things. 4. LO: I can construct a classification key to group, identify and name living things. 5. LO: I can analyse how changes to an environment could endanger living things and argue against human changes.	Characteristics Movement Reproduction Sensitivity Growth Respiration Excretion Nutrition Reptiles Amphibians Invertebrates Insects Mammals Fish Vertebrate Invertebrate Minibeast Pupae and larvae Huntsman Bunker Hill Wood Human Positive Negative	1.Is fire alive? Chn to think about what characteristics make an object a living thing. Introduce Mrs Gren and how we can use this to explain and identify the 7 life processes. Show chn some pictures of objects and creatures and discuss if they are living or not based on all 7 life processes**.(Round Robin)** Present questions such as 'Miss Ward thinks the skateboard is alive because it moves, is she correct?' 2. Are all creatures the same? Explore ways of grouping amphibians, birds, insects, reptiles, mammals and fish. Starter- ask chn to guess the animal that you have in your head. What questions could they ask to get to the answer quicker? **Round robin-** ask chn to think about all the different ways that animals could be grouped, eg number of legs, fur/scales etc. Explain the 6 different animal groups to the chn getting them to make notes in their notebooks. Assign each table an animal group and ask them to research further using books and ipads in order to create a poster that they can present back to their peers**. (One stray)** 3. Is classifying creatures as simple as yes and no? Mini beast hunt to find some insects around school. Children will be grouping and classifying different creatures in the lesson- Forest school link. Starter- Look at a flow chart to find out what Disney character they are, during this they should start to unpick the features of classification. As a table group give chn liquorice all sorts and ask them to use a flow chart to sort them. Feedback, did the chn find it easy/hard? What was difficult? Analyse a flow chart that has already been created and see if it matches the chns flow charts in any way. Introduce a classification key and how they are similar to flow charts. Recap the different insects they found during their hunt and some others they may not have found. Could these have been added to the classification key too? How is a flow chart and classification key similar? 4 Which is the only animal group without a backbone? Can an invertebrate have an x-ray? Starter- **round robin,** what are the 6 classification of animals and what are their specific characteristics? (building on last week's learning and y3 knowledge) Recap the terms vertebrate and invertebrate, which animal group is invertebrate? As a group, children should sort vertebrates and invertebrates into a venn diagram. Chn to look at skeletal pictures and identify which group the animal belongs to and why, which group is not there? Why? Talk about the platypus and why it is such an exceptional creature. Chn to create their own classification key to separate the different groups depending on their specific characteristics. 5. Are humans destroying the environment? Mini quiz to discuss what children know already about climate change (news links) Look at the pictures of different landscapes and the affect humans have had. Look at images of beaches and other landscapes and how they changed over time. Chn to create a mind map on thinking boards and indicate whether they think the changes made are positive or negative **(timed pair share) y3 link to wind farms** Show chn footage taken from woodlands of deer, foxes and badgers (retrieved from a nature reserve locally.) Ask chn if anyone has ever been to Bunkers Hill Wood, explain where this is and why it is important for animals.Tell chn that Stourbridge council plan to build houses on this area, what repercussions would this have on the animals who live there? Chn to create an argument and debate, arguing against the buildings in the wood to the council.

Science – Sound – Autumn 2

Key Question – How does sound travel?

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: identify how sounds are made associating some of them with something vibrating, recognise that vibrations from sounds travel through a medium to the ear, find patterns between the pitch of a sound and features of the object that produced it, find patterns between the volume of a sound and the strength of the vibrations that produced it, recognise that sounds get fainter as the distance from the sound source increases.	For children to develop an enquiring mind and desire to independently investigate. For children to be able to work scientifically in order to investigate using scientific principles. Lessons should be practical and 'hands-on' wherever possible. Quiz type knowledge based learning log 'tests' To begin to consider questions that they are able to investigate scientifically, for themselves.	Pathway 1 – Physics 1. LO: I can describe how sound is made. 2. LO: I can explain how sound travels from a source to our ears. 3. LO: I can explain the place of vibration in hearing. 4. LO: I can analyse the correlation between pitch and the object producing a sound. 5. LO: I can explain what happens to a sound as it travels away from its source.	Sound waves Vibrations Ear drum Messages Frequency Pitch Larynx Pinna Stirrup Cochlea Auditory nerve Eustachian tube Anvil Hammer Ear drum Sound canal Dense	<u>Learning log- How does sound travel?</u> 1. Why do you think sounds are louder the closer they are to us? Chn to think about the different sounds they hear when in particular situations, e.g. classroom, park. **All write round robin.** Think about which sounds could be loud and which ones quiet, why may this be? Watch a clip to show children how sound waves travel through vibrations. Ensure key questions are presented before hand so chn understand what to look for. Chn to explain how sound is made and how our brain interprets the waves into particular frequencies and messages. 2. How does an actual telephone work? Ask chn to speak and feel the vibrations in their larynx to reinforce that vibrations make sound. Chn to create a string telephone in pairs and experiment sending messages to each other through the cups. Experiment sending the same message at the same volume without the cups, was it easier to hear with or without the string telephone? Chn should experiment with keeping the string taut and then making it loose to see the difference in sound. Does the telephone work if you are round a corner? Ask children how they think the telephone works using what they learnt last lesson. Teach how the vibrations in the cup from speaking extend through the string into the other cup. 3. How many parts of the ear are there? Does any work harder than another? Chn to think about what animals are good at hearing, eg dogs, owls, bats and why these animals have particularly good hearing. Teach children how the shape and movement of animals' ears allow them to hear oncoming predators. The ear shapes of animals determine whether they are a predator or prey. Watch a clip that shows the inside of the ear and the structure that works together in order for us to turn the sound waves into messages that our brain recognises as particular sounds. Talk through the journey of sound waves through the ear using a diagram to reinforce the video. Chn to create a 3D model of an ear and label in teams to explain how each part helps in the process of transforming waves to messages. 4. Does the pitch affect the volume of a sound? Recap how sound is made and how vibrations can affect the pitch of these sounds. Teach chn the difference between low and high pitch and how this relates to how quick or slow sound waves vibrate. Show chn the different types of waves for high and low frequency focusing on how close/far apart the individual waves are to one another. Experiment with water and bottles, can the children create 3 different pitches using this equipment and explain how/ why it worked. Chn to explain how pitch changes and give examples. 5. Which state of matter does sound travel through easiest? How can we measure this? Show children the difference in particles between solids, liquids and gasses. Explain how sound can travel through all 3 properties and show them clips to reinforce this. Children experiment with tuning forks and listening to see if they can hear the vibrations using a stethoscope for solids. <u>Learning log- quiz questions.</u>

Science – Spring 1
Why did the Romans use pottery in cooking but pumice to build with?

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: Compare and group materials together, according to whether they are solids, liquids or gases. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	**Children begin to recognise how scientific concepts relate to their everyday lives.** **To begin to consider questions that they are able to investigate scientifically, for themselves.** **Children learn to record their investigations and results in a variety of ways and learn to identify the most effective method.** **For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest.**	**Pathway 2- Physics** 1. LO: I can identify and classify materials according to whether they are solids, liquids or gases. 2. LO: I can analyse how materials change state. 3. LO: I can experiment and hypothesise about how a material will change state. 4. I can hypothesise whether a material can be both a solid and a liquid at the same time. 5. LO: I can identify and explain the different stages of the water cycle.	Solid Liquid Gas Molecule States of matter Structure Evaporation Freezing Melting Condensation Freezing point Melting point Cornflour Non-Newtonian liquid Precipitation Collection Cycle	<u>Learning log- What do children already know about a solid, liquid and a gas?</u> 1. Children will learn about the molecular structure of different materials and how this affects their state of matter. Why is pumice rock lighter than other rocks? Can rocks float on water? How are the states of matter structured and how does this affect their properties? 2. Recap the properties of all 3 states of matter Show chn a picture of an ice cube and a pool of water, what has happened in order for this change to happen? Examine the 4 different ways in which objects change to a different state of matter. Teach about the difference between the melting and freezing points of objects and how for most materials these are the same. How can an object have the same freezing and melting points? 3. Through experimenting with a solid, liquid and a gas, children will measure and record how these materials change states. Children will make predictions and hypothesise before testing out the materials e.g. salt on an ice cube. Discuss what process is taking place each time. Why is this happening? How does grit on icy roads keep us safe? 4. Children to hypothesise about a solid and a liquid sharing the same properties through an experiment involving Non-Newtonian liquid. Children to learn about pressure and how this changes the state of cornflour. Why is it called non-Newtonian liquid? Is it a solid or a liquid? 5. Show chn a clip of the water cycle, they should answer the questions in front of them and discuss these after. Explain the process of the water cycle discussing the 4 different important parts. Chn to recreate the cycle using artistic skills as a class and then retelling it through an individually made comic strip. Why is this called a cycle? What is the most important part? <u>Learning log – Children to show their progression through quiz style questions</u>

Science – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions Comparing the teeth of carnivores and herbivores, and suggesting reasons for differences.	Children will be encouraged to understand how the concepts relate to their own lives and to further develop their knowledge by asking further questions. Children develop an extensive knowledge of a range of scientific vocabulary and are able to use them in context. Children begin to recognise how scientific concepts relate to their everyday lives.	**Pathway 3- Biology** 1. LO: I can identify the main organs and their functions in the human body. 2. LO: I can identify, name and explain the parts of the human digestive system. 3. LO: I can identify and describe the functions of different human teeth. 4. LO: I can compare and contrast human teeth with animal teeth. 5. I can use food chains to identify producers, predators and prey. 6. I can construct food chains to identify producers, predators and prey.	Mouth Teeth Salivary glands Oesophagus Gall bladder Liver Duodenum Stomach Large intestine Small intestine Pancreas Rectum Incisors Canines Molar Premolar Wisdom Teeth Heart Lungs Brain Omnivore Carnivore Herbivore	1. Numbered heads together – what are our most vital organs? Chn to think about why organs are important to the human body and talk through their different functions. Which organ is the most important and why? Are we able to pick one? What is your opinion on organ donation? 2. Ask chn if they know what happens to food once it has entered your mouth. Using previous knowledge of organs, what organs do chn think are important in the digestive system? Explain the process from mouth to excretion using tights and food model. What is the most important part of the digestive system? 2. Science week- Chn to create own digestive system using household items and explain the process as they are making. https://www.stem.org.uk/resources/elibrary/resource/35396/digestive-system-experiment. Finish with a who wants to be a millionaire quiz to check learning of this process. How is an animal's digestive system similar/different to a human? 3. Talk to chn about the start of the digestive process (the mouth) Ask chn to feel around their mouth with their tongue are all their teeth the same? Get them to experiment with eating a slice of apple with only their front teeth, this should be tricky as incisors are not made for this job! Talk through the functions of the 4 different types of teeth and ask chn to label and explain their uses. Why are wisdom teeth no longer needed in a human mouth? Why do teeth begin to rot? 4. Recap the different teeth in humans- do animals have the same teeth? Talk to chn about the 3 different diets of animals and how this affects the shape of their teeth. Omnivores, herbivores, carnivores. Guess the animal quiz based on their skulls/moulds of teeth. Compare and contrast an animals teeth to a humans. What would happen if a lion had teeth like an elephant? Science experiment about tooth decay – what speeds up this process? Why do teeth decay? How can this be prevented? 5. Is the biggest animal always the predator? Teach children about food chains and how energy moves through the chain. Investigate food chains in different habitats before creating their own.

Science – Summer 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Describe the simple functions of the basic parts of the digestive system in humans. Identify the different types of teeth in humans and their simple functions Comparing the teeth of carnivores and herbivores, and suggesting reasons for differences.	Children will develop scientific vocabulary in a variety of ways enabling them to discuss scientific concepts with confidence. Children will be encouraged to understand how the concepts relate to their own lives.	**Pathway 3- Biology** 1. LO: I can identify herbivores, carnivores and omnivores, and observe the differences between them. 2. LO: I can use food chains to identify producers, consumers, predators and prey 3. LO: I can construct my own food chain identifying the producer, consumer and predator. 4. LO: I can explain how energy is passed along a food chain.	Omnivore Carnivore Herbivore Predator Consumer Secondary Tertiary Energy	1. Are all predators omnivores? Teach children about herbivores, carnivores and omnivores. Explain the characteristics of each one, focusing on the teeth and diet. 2. Is the biggest animal always the predator? Teach children about food chains. Investigate food chains in different habitats before creating their own. What is the purpose of a food web? What can we learn from it? 3. How do creatures get their energy? After identifying the different types of consumers and predators, teach children how energy is passed along the chain. Give examples of food chains within different environments.

Science – Summer 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors	Children will be encouraged to understand how the concepts relate to their own lives and to further develop their knowledge by asking further questions. Children develop an extensive knowledge of a range of scientific vocabulary and are able to use them in context. Children begin to recognise how scientific concepts relate to their everyday lives.	**<u>Pathway 1 – Physics</u>** LO: I can explain what electricity is. I can analyse how my life has been affected by Benjamin Franklin, Nikola Tesla and Thomas Edison. LO: I can identify and name appliances that require electricity to function. LO: I can identify and explain the components in a series circuit LO: I can construct a series circuit and evaluate how effective it is. LO: I can predict and test whether a bulb will light within a circuit by using a switch. LO: I can describe the difference between a conductor and insulator.	Mains/battery operated Conductor Insulator Component Switch Negative/ Positive (Terminals) Lightbulb Battery/ Cell Circuit Static Wires	Quick quiz to find out what chn already know about electricity. Round Robin to list different electrical items they already know. Show Benjamin Franklin, Nikola Tesla and Thomas Edison and how they have changed our lives today. What would the world look like without electricty? Y3 link to stone age. Talk to chn about the electrics source, is it mains? Teach the difference between mains and battery operated electricity. How does the voltage change if an item is battery/mains operated? Ask chn what we mean by the term circuit. Look at the variety of components that can be found in a simple circuit and then move onto a more series circuit. Teach chn the corresponding symbols to the different components. What could stop a circuit from working? Allow chn time to explore different components and see if they can get them to work. Can they fix their own issues and explain why their component may not be working? What would happen if we only had 1 battery and increased the amount of components in a circuit? Teach chn about the different types of switches. How do we usually tell if a switch is on? Explain hiw a switch breaks a circuit when turned off. Allow chn time to experiment with switches and different components. Can they draw these into their book using symbols? Chn to look at set circuits and predict whether they will work. What is the difference between a conductor or insulator?

Year 5

Science - Autumn 1	Context –Solar System			
NC PoS	**Key Concepts Link**	**Key Competencies**	**Vocabulary**	**Activity**
Earth & Space	• I can describe and explain the movement of the Earth and other planets relative to the Sun. • I can describe and explain the movement of the Moon relative to the Earth. • I can explain and demonstrate how night and day are created. • I can describe the Sun, Earth and Moon (using the term spherical).	**LO: to analyse the movement of the Earth and other planets relative to the Sun** **LO: to formulate an explanation about how day and night/ seasons vary on other planets.** **LO: to debate how theories about the Solar System have changed over time** **LO: to investigate the movement of the moon relative to Earth and other planets.**	Heliocentric Geocentric Spherical Relative Movement Theories Galileo Copernicus Mercury Venus Mars Jupiter Saturn Neptune	L1-Start by ordering the planets in the Solar System and then focus on how they move relative to the sun. Use models of the planets and inflatable planets which children can move around the sun to show the movement. What impact does this have on the other planets (link to next lesson day and night, months etc) Children to analyse what effect the sun has on Earth and then on other planets. L2-First teach how day and night are created on Earth. Then investigate how this is different on other planets e.g. one year in Jupiter is the same as nearly 12 earth years and Mercury's day is 1,408 hours. Children to investigate this and then formulate their own explanation. Present in their chosen way e.g. they could create a graph to show this and then make comparisons about these and why it is different and what they notice about the further away you get from the sun building on knowledge from last lesson. L3-Learn about the theories of Copernicus, Galileo etc and compare how they have changed over time. Introduce the Heliocentric and Geocentric model of the Solar System and children are to write a debate about why they think it has changed and what the impact was on other theories. L4-Children to investigate the moon, the fact that it is not a light source, lunar eclipses etc. Then research moons on other planets such as Mars and compare with Earth.

Science - Autumn 2 Context –Material World

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
<u>Pathway 2 Chemistry</u> Material World (Properties and change of materials)	**Properties and changes of materials** • I can compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets). • I can describe how a material dissolves to form a solution; explaining the process of dissolving. • I can describe and show how to recover a substance from a solution. • I can describe how some materials can be separated. • I can demonstrate how materials can be separated (e.g. through filtering, sieving and evaporating). • I know and can demonstrate that some changes are reversible and some are not. • I can explain how some changes result in the formation of a new material and that this is usually irreversible. • I can discuss reversible and irreversible changes. • I can give evidenced reasons why materials should be used for specific purposes.	**LO: to compare and contrast materials, classifying them based on their properties and formulate an explanation as to why.** **LO: to produce an experiment to show how a material dissolves to form a solution.** **LO: to analyse how materials can be separated, using knowledge of solids, liquids and gasses.** **LO: to analyse reversible and irreversible changes.** **LO: to evaluate evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.**	Hard Tough Strong Rigid Elastic Plastic Flexible Electrical conductor Thermal conductor Solution Solute Dissolve Evaporate Mixture Soluble Insoluble Filter Reversible change Irreversible change	L1- Children walk into the classroom with a variety of materials already on tables. Children write words to describe the materials on post it notes on each table. Teach children how to classify materials and test and group materials based on their properties. Children to classify the materials into categories based on their properties, photograph the categories for books and write an explanation as to why they are in that category. Do some materials link to more than one category? L2- Scientific enquiry based – investigation lesson. Explain the term **dissolve** and give some examples of materials that dissolve. Ask children to predict possible methods to speed up this process e.g. salt in warm water or stirring. Children are to independently plan and conduct an experiment to show how to make a variety of materials dissolve to form a solution. Children to then analyse and record findings and predict how to recover a substance from a solution. Can this always happen? L3- Recap what do we know about solids, liquids, gases from year four? Padlet what they can remember and then re-teach any misconceptions or gaps in knowledge. Scientific enquiry based - investigation lesson. Ask children to predict how can we separate a variety of materials? Teach what a fair test is and explain the importance. Children to independently plan and conduct an experiment to separate different types of materials by a variety of methods e.g. sieving, heating, mixing. Children to analyse and record their findings and make links. L4- Recap last lesson and ask whether any of the material separations could be reversed. Explain the term **reversible**. Demonstrate to children how some changes of state can be reversible eg: ice melting. Introduce the fact that some materials changes however, are irreversible – particularly involving burning. Demonstrate the action of acid on bicarbonate of soda. Children to carry out an investigation into which changes they predict will be reversible or not and then try this out as an experiment. Analyse- were they correct? L4- Children to gather evidence from the last few lessons to determine why particular materials are used for particular uses. Give them a PMI (positive, minus, interesting) question to analyse: **What if we could only use wood to make every item we have?** Children to record what would be good about this, what would be negative and what would be interesting. E.g. this would mean that clothing would need to be made out of wood, houses would be built from wood, umbrellas, laptops, cars etc would be made from wood. What would happen? Children to analyse why particular materials are used for particular uses.

Science – Spring 1 Context- Forces

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Physics Working Scientifically	**Forces** To explain what gravity is and its impact on our lives. To analyse and explain the effect of air resistance. To analyse and explain the effect of water resistance. To analyse and explain the effect of friction. To explain how levers, pulleys and gears allow a smaller force to have a greater effect. To plan different types of scientific enquiry. To control variables in an enquiry. To measure accurate and precisely using a range of equipment. To record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. To use the outcome of test results to make predictions and set up a further comparative fair test. To report findings from enquiries in a range of ways. To explain a conclusion from an enquiry. To explain causal relationships in an enquiry. To relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. To read, spell and pronounce scientific vocabulary accurately.	LO: to analyse the force of gravity acting between the Earth and a falling object. LO: to devise an investigation to test the effect of air resistance. LO: to predict the effect of friction and test my hypothesis. LO: to evaluate the effect of water resistance on streamlined objects. LO: to justify why some mechanisms allow a smaller force to have a greater effect.	**Gravity:** the natural force of attraction exerted by a celestial body. **Weight:** the force with which something is attracted to the Earth. **Newton:** the unit of force. **Non-contact:** not touching. **Isaac Newton:** a famous English scientist who first developed the theory of gravity. **Galileo:** a famous Italian scientist who first used scientific evidence to back up his theories. **Friction:** the force made when two objects rub against each other. **Air resistance:** the resistance of air to forward movement. **Water resistance:** the resistance of water to forward movement. **Force meter:** an instrument for measuring forces. **Reliable:** something that can be depended upon. **Lever:** a rigid bar that transmits force and motion. **Spring:** a coil of wires that can transmit a force and motion. **Gear:** a toothed wheel that fits into another gear to transmit motion. **Pulley:** a mounted rotating wheel with a grooved rim over which a chain or string can move to change the direction of a pulling force.	**1. What is gravity?** Introduce Isaac Newton and address the misconception and difference between weight and mass. Investigation-Children to create their own investigation to find out the relationship between the mass and weight of objects. Children to record positive and negative correlation on scatter graph. Children to analyse what life would be like without gravity and link to our previous solar system topic- gravity in space. **2. What is air resistance?** Watch videos and research air resistance, streamlined objects and animals. Children to devise their own parachute investigation to test how the surface area of a parachute affects the speed in which it falls. Analyse variables and fair test. Children do drop tests to test their hypothesis and then analyse their results. **3. What is friction?** Introduce friction, how we can increase and decrease friction. Forces acting on a car- all forces. Children plan and carry out an investigation into how different surfaces affect the speed of an object e.g. on grass, wood, concrete, gravel. Children to make predictions and then test their hypothesis and evaluate. **4. What is water resistance?** Teach children what water resistance is and analyse how animals and objects are streamlined and adapted for water resistance. Specifically choose an animal e.g. polar bear to see how their body has adapted to allow less water resistance. Investigation- which shapes have less water resistance. Children to create an investigation into how to make the most streamlined boat, test it and then evaluate results. **5. What are mechanisms?** Children to learn which mechanisms allow a smaller force e.g. lever, pulley. Children to make own cars using these mechanisms and justify why some mechanisms in real life allow smaller force to be more effective. Children to evaluate their results against the original hypothesis.

Science – Spring 2 Context- Circle of life

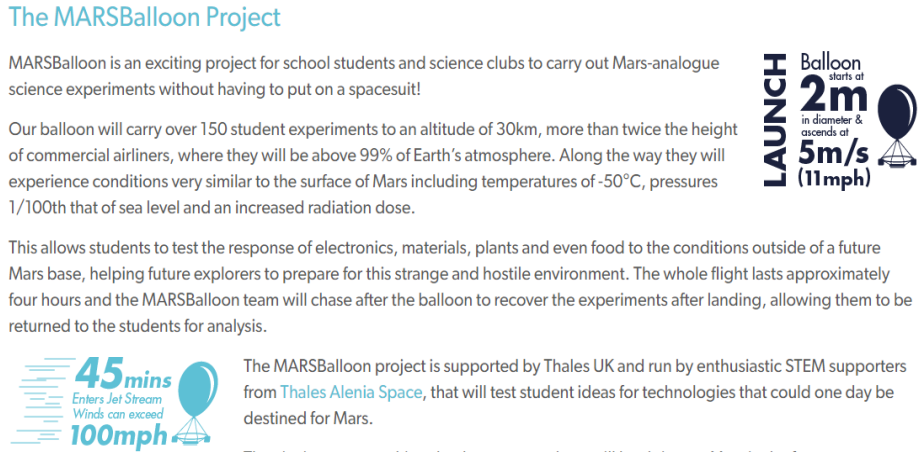
NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Biology Pupils should be taught to: □ describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird □ describe the life process of reproduction in some plants and animals. Pupils should be taught to : □ describe the changes as humans develop to old age. Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of Science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	Pathway 3 – Biology LO: to compare and contrast the life cycles of mammals, amphibians, birds and insects. LO: to investigate the process of reproduction in plants. LO: to analyse and make links between reproduction in animals and humans. LO: to create a timeline to indicate stages of growth in humans.	**Bulb:** a part of a plant that stores food underground. Can grow a new shoot. **Pollination:** when pollen from one plant is transferred to the ovary of another. May be completed using wind, insect or bird transference between plants.. **Seed Dispersal:** when the seeds leave the 'parent' plant. This may be using the wind, animals or an internal plant mechanism (explosion) **Germination:** when the plant begins to grow. **Fertilisation:** when an egg and pollen (or sperm) join together. **Larva:** the young form of some animals, which looks very different from its parents. It undergoes a dramatic change to become an adult, and loses its young features or gains new ones. **Gestation:** when a baby animal develops inside its mother. **Metamorphosis:** a dramatic change in the life cycle of an animal in which it ends up looking totally different. **Larva**: the young form of some animals, which looks very different from its parents. It undergoes a dramatic change to become an adult, and loses its young features or gains new ones. **Gestation**: when a baby animal develops inside its mother. **Metamorphosis:** a dramatic change in the life cycle of an animal in which it ends up looking totally different.	Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. Plant mini wildflower garden seed growing section to observe over time. Double page spread that compares life cycles of mammals, amphibians, birds and insects. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants. **Working scientifically** - Lilly experiment to identify parts of flower and explain how pollen is transferred/recap methods of seed dispersal. Lesson will continue on Science day looking at methods of propagation for the asexual process. Celebrating World Science Day - Theme Growth Pupils might **work scientifically by:** observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences- create presentation. **Working scientifically** - They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs (Asexual reproduction). Pupils should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. **Non chronological research reports/cross curricula link** Nurse talk /PSHE link Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty.)Pupils could **work scientifically by researching the gestation periods of other animals and comparing them with humans;** by finding out and recording the length and mass of a baby as it grows. Analyse links between reproduction in animals and humans too.

Science – Summer 1 Context- Circle of life Continue from Spring 2 due to Pioneer

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Biology Pupils should be taught to: ▯ describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ▯ describe the life process of reproduction in some plants and animals. Pupils should be taught to : ▯ describe the changes as humans develop to old age. Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of Science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	Pathway 3 – Biology LO: to analyse and make links between reproduction in animals and humans. LO: to create a timeline to indicate stages of growth in humans.	**Bulb:** a part of a plant that stores food underground. Can grow a new shoot. **Pollination:** when pollen from one plant is transferred to the ovary of another. May be completed using wind, insect or bird transference between plants.. **Seed Dispersal:** when the seeds leave the 'parent' plant. This may be using the wind, animals or an internal plant mechanism (explosion) **Germination:** when the plant begins to grow. **Fertilisation:** when an egg and pollen (or sperm) join together. **Larva:** the young form of some animals, which looks very different from its parents. It undergoes a dramatic change to become an adult, and loses its young features or gains new ones. **Gestation:** when a baby animal develops inside its mother. **Metamorphosis:** a dramatic change in the life cycle of an animal in which it ends up looking totally different. **Larva**: the young form of some animals, which looks very different from its parents. It undergoes a dramatic change to become an adult, and loses its young features or gains new ones. **Gestation**: when a baby animal develops inside its mother. **Metamorphosis:** a dramatic change in the life cycle of an animal in which it ends up looking totally different.	Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals. Pupils might **work scientifically by:** observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try **to grow new plants from different parts of the parent plant**, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. Pupils should draw a timeline to indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could **work scientifically by researching the gestation periods of other animals and comparing them with humans;** by finding out and recording the length and mass of a baby as it grows.

Science - Summer 1 Context-Nutrition and the human body New learning

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Biology (Y6) intro **Animals including humans** Pupils should learn how to keep their bodies healthy by eating a balanced diet. They should recognise the impact of diet on the way their bodies function Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, lifestyle and health.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of Science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Pathway 3 Biology** LO: to analyse what constitutes a nutritious, balanced diet. LO: to formulate an explanation about the importance of a balanced diet. LO: to investigate the role of sugar in our diet and the effect on the human body. LO: to compare the effect of healthy fats with unhealthy fats on the human body.	Human body Nutrition Nutritional content Balanced diet Eat well plate Energy source Sugar Proteins Fats Carbohydrates Fruit/vegetables Fibre Food labelling Milk/dairy Obesity	1. Children to explain the key facts to a balanced diet. Analyse the Eat well plate – consider how well they eat presently. Discuss food labels as a means of identifying nutritional content. Pupils to colour code and annotate their own food diary from over Easter to identify/consider how nutritional the food is that they eat currently. Children to analyse benefits of nutrition and balanced meals. 2. Extended writing cross curricular link – pupils to produce an explanation that explains the importance of balanced diets and the types of foods we should be eating. These can then be presented and recorded. via an I-pad as a healthy food educational video for the younger pupils in school. 3. Scientific enquiry –understand the role of sugar in diet and analyse the effect it can have on the body. Analyse the many health conditions that too much sugar leads to. Conduct an experiment to show the effects of sugar on the human body. Analyse the amount of sugar in 'healthy' products such as smoothies and cereal bars. 4. Scientific enquiry – compare and contrast healthy fats with unhealthy fats. Explain the positive and negative effects that fats have on the human body. Conduct experiment to analyse the amount of fats in certain foods. 5. **Scientific enquiry – additional topic –Nationwide Science competition. Conduct an experiment to send an item to travel to Mars like atmospheric conditions. These items will then be sent to the Science station, where they will travel via balloon up and out of the Earth's atmosphere. Experiments will then be returned so pupils can analyse the results and effect on their chosen items!** https://www.thalesgroup.com/en/futuremartians



Science – Summer 2 Context-Nutrition and the human body

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Biology (Y6) intro **Animals including humans** Pupils should learn how to keep their bodies healthy by eating a balanced diet. They should recognise the impact of diet on the way their bodies function Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, lifestyle and health.	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of Science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Pathway 3 Biology** LO: to analyse what constitutes a nutritious, balanced diet. LO: to formulate an explanation about the importance of a balanced diet. LO: to investigate the role of sugar in our diet and the effect on the human body. LO: to compare the effect of healthy fats with unhealthy fats on the human body. The MARSBalloon Project MARSBalloon is an exciting project for school students and science clubs to carry out Mars-analogue science experiments without having to put on a spacesuit! Our balloon will carry over 150 student experiments to an altitude of 30km, more than twice the height of commercial airliners, where they will be above 99% of Earth's atmosphere. Along the way they will experience conditions very similar to the surface of Mars including temperatures of -50°C, pressures 1/100th that of sea level and an increased radiation dose. LAUNCH Balloon starts at 2m in diameter & ascends at 5m/s (11mph) This allows students to test the response of electronics, materials, plants and even food to the conditions outside of a future Mars base, helping future explorers to prepare for this strange and hostile environment. The whole flight lasts approximately four hours and the MARSBalloon team will chase after the balloon to recover the experiments after landing, allowing them to be returned to the students for analysis. 45 mins Enters Jet Stream Winds can exceed 100mph The MARSBalloon project is supported by Thales UK and run by enthusiastic STEM supporters from Thales Alenia Space, that will test student ideas for technologies that could one day be destined for Mars.	Human body Nutrition Nutritional content Balanced diet Eat well plate Energy source Sugar Proteins Fats Carbohydrates Fruit/vegetables Fibre Food labelling Milk/dairy Obesity	1. Children to explain the key facts to a balanced diet. Analyse the Eat well plate – consider how well they eat presently. Discuss food labels as a means of identifying nutritional content. Pupils to colour code and annotate their own food diary from over Easter to identify/consider how nutritional the food is that they eat currently. Children to analyse benefits of nutrition and balanced meals. 2. Extended writing cross curricular link – pupils to produce an explanation that explains the importance of balanced diets and the types of foods we should be eating. These can then be presented and recorded via an I-pad as a healthy food educational video for the younger pupils in school. 3. Scientific enquiry –understand the role of sugar in diet and analyse the effect it can have on the body. Analyse the many health conditions that too much sugar leads to. Conduct an experiment to show the effects of sugar on the human body. Analyse the amount of sugar in 'healthy' products such as smoothies and cereal bars. 4. Scientific enquiry – compare and contrast healthy fats with unhealthy fats. Explain the positive and negative effects that fats have on the human body. Conduct experiment to analyse the amount of fats in certain foods. 5. **Scientific enquiry – additional topic –Nationwide Science competition. Conduct an experiment to send an item to travel to Mars like atmospheric conditions. These items will then be sent to the Science station, where they will travel via balloon up and out of the Earth's atmosphere. Experiments will then be returned so pupils can analyse the results and effect on their chosen items!** https://www.thalesgroup.com/en/futuremartians

Science - Summer 2 Context- Super scientists in the real world
Project day - cross -curricula links with writing/computing/drama
(Topic in addition to all year 5 topics as these have already been covered)

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Living things and their habitats Properties and changes of materials	For children to understand and have the confidence and vocabulary to discuss their knowledge and understanding of Science. For children to develop an enquiring mind and desire to independently investigate and research scientific areas of interest. For children to be able to work scientifically in order to investigate using scientific principles.	**Pathway – Scientists in the real world.** Project day revisiting some of the science topics and investigations previously covered in year five, however, this time advancing the science knowledge further by researching some of the government recommended super scientists linked to each topic. The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should **Living things and habitats scientist link:** **Notes and guidance (non-statutory)** Pupils should study and raise questions about their local environment throughout the year. They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. **Properties and changes of materials:** reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.	Scientists Career Investigate Research Discovery Perseverance Dedication Links to wider world Conclusions Mistakes Key learning points Impact on wider world	Using the extension guidance suggestions, as set out in the National Curriculum – pupils will be researching, investigating and learning about major scientists that link with our year 5 topics – and how their science has impacted on the wider world, and ideas have changed over time. Scientists to be studied include: • David Attenborough • Jane Goodall • Spencer Silver • Ruth Benerito Children to have a carousel of activities – rotating around each scientist in turn to discover their background, scientific discoveries and learning curves and scientific impact on the wider world. Following extensive research, pupils will then choose a scientist to produce a green screen presentation as an interview/show on.

Science – Summer 2 Context- Investigation day (apples)

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Scientific enquiry	I can plan different types of scientific enquiry. • I can control variables in an enquiry. • I can measure accurate and precisely using a range of equipment. • I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • I can use the outcome of test results to make predictions and set up a further comparative fair test. • I can report findings from enquiries in a range of ways. • I can explain a conclusion from an enquiry. • I can explain causal relationships in an enquiry. • I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. • Read, spell and pronounce scientific vocabulary accurately.	LO: to plan a scientific enquiry linked to a key hypothesis LO: to record data and results and report findings from enquiries in a range of ways LO: to use the outcome of test results to make predictions and set up a further test LO: to analyse whether evidence supports my hypothesis	Enquiry Hypothesis Report Outcome Predictions Support Acid PH level Citrus	1. Explain the real life link- Last half term when we did cooking, the class noticed something about the apples. They asked why the apples had gone 'mouldy' when they had gone brown. 2. Today we will investigate why this happens and create our own investigations into how to prevent this. 3. Investigation- explain to children the ingredients that they will have available (lemon juice, apple juice, lime juice, milk, vinegar, soda water etc) discuss the question that they want to test. Give children investigation prompts to help to structure their investigation and then give them time to work out what their hypothesis is and how they will test this. (Independent enquiry based investigation) 4. Give children time to carry out the investigation and then analyse their results. Challenge children to find links and extend further using outcomes to set up a further test. E.g. if lemon juice works then why (PH level) then test will other citrus juices such as lime and orange work the same? 5. Children to analyse whether their evidence from both investigations supports their initial hypothesis or whether they need to change variables.

Year 6

Science - Classifying Critters (Living things and their habitats) – Autumn 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Biology	I can give reasons for classifying animals based on their similarities and differences. To consider what physical features are similar and different between given organisms.	To outline how living things can be classified into groups scientifically. To explain how to use classification keys. To describe how living things can be classified into broad groups. To construct an investigation which proves that micro-organisms are living things. To compare and contrast different micro-organisms. To produce biographical writing on a relevant scientist.	**Classification** – the action or process of sorting something. **Species**: the sub-group within the genus that an organism belongs to. **Genus**: the group that an organism belongs to. **Organisms**: living things. **Classification** - organising things into groups. **Micro-organism**: a microscopic organism, especially bacteria, virus or fungus. **Carl Linnaeus**: A Swedish botanist.	AFL opportunity: Entry point to topic to include multiple choice and true or false knowledge quiz. Opportunity for more able pupils to expand on these and present their knowledge in a variety of ways. Pupils to use mind maps to outline the characteristics of plants and animals. Children will analyse how plants and animals can be sorted based on their features and characteristics. Children will understand and deconstruct a variety of different classification keys. Children will design and produce their own classification keys using liquorice all sort sweets. Children will explain how plants can be classified in multiple ways. Children will generate work which showcases how plants can be categorised in four ways, using chrome books, fact files and library books. The science learning wall will be utilised as children construct and carry out an investigation to try and prove that micro-organisms are living things. Planning and predictions will be displayed visually in class before the experiment is constructed and results are analysed. Work will be produced in a variety of independent ways to show comparisons between micro-organisms (power point, leaflet, non-chronological report). Children will design a poster or produce a biography all about the life and work of Carl Linnaeus. AFL: End of topic assessment: children will apply the learning from the topic in a variety of open ended questions.

Science – Staying Alive (Animals including Humans) – Autumn 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Pupils should be taught to: • identify and name the main parts of the human circulatory system • describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans.	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	Pathway 3 – Biology I can **explain** the role of the heart, blood vessels and blood in the human circulatory system I can **generate** a model that demonstrates my knowledge and understanding of the human heart Pathway 4 – Working Scientifically I can **investigate** which activity increases my heart rate the most L4 I can **summarise** how water and nutrients are transported in animals, including humans L5 I can **produce** a poster to educate people on the health risks and how to lead a healthy lifestyle	**Absorb** - take in or soak up **Aorta** - the main artery in the human circulatory system **Artery** - the tubes that carry oxygenated blood **Atrium** - the upper chambers of the heart **Blood Vessels** - the tubes that carry blood around the body **Deoxygenated** - blood that is not carrying oxygen **Nutrients** - a substance that provides nourishment **Oxygenated** - blood that is carrying oxygen Pulse - the beat of your heart **Vein** - tubes that carry deoxygenated blood back to the heart **Vena Cava** - a large vein that carries deoxygenated blood into the heart **Ventricle** - the main chambers of the heart **Villi** - finger-like structures that line the small intestine to absorb water and nutrients	Staying Alive vocabulary sheets to be introduced – children to traffic light assess understanding as they work through the unit. Retrieval 'KWL' task – What do they already know about Staying Alive topic? Refer to Science working wall and have children post-it note the "W" questions they generated for use on their classroom display. L1 - Check in the lesson (traffic light) by asking the children to complete a brain dump task answering the open question - What does the heart do? They can explain what they think by writing, drawing a diagram. Discuss the new vocabulary introduced and teacher discussion will provide an overview of the main concepts behind the circulatory system. Have children make notes while watching video outlining the journey a blood cell would make through the system. Children complete a diagram of the system using label explanations. L/A – have labels given to sort and cloze section for each explanation. L2 – Teachers discussion and video/ demonstration of the heart in action and how its purpose/ operation makes it a vital organ within the human body. Blue/ red colourations linked to the scientific terms (deoxygenated/ oxygenated) and children use these to label and create a heart model. Support given where needed. Children then generate a creative story (option: storyboard/ written/ poster format) retelling the journey a blood platelet would take making visits ti the heart in various stages in the system. Key vocab must be used. Report piece. L3 – Children discuss their understanding of the term pulse and what it means in terms of the heart. They work in partners to plan an experiment into which exercise will effect their pulse. Children are reminded to think about variable, a control, fair testing and making an informed prediction/ hypothesis. A conclusion must be generated to explain and support their findings linking to why their heart rate increased during the most strenuous exercise that they completed. (Refer to results) A model worksheet to be given to support group. L4 – Children research using QR code references and chrome book search engines facts about the key components transported within our body – nutrients and water. Alongside teacher instruction, children work in teams to produce a presentation summarising their learning – using the checklist to help structure their work. They summarise their understanding completing the evaluation task at the end to check out the lesson. L5 – In pairs, children analyse information provided about healthy living. Can they identify what health risks are out there? What are the potential problems caused by hazards? Children and teacher discussion for chn to gather facts and idea sharing about how to present their learning. Q. Which do you think is the most important factor of leading a healthy lifestyle? Why? Children create an informative poster that can be used around school to promote healthy life choices and raise the awareness of the dangers of certain "risks". **End of unit assessment** and learning log quix recorded on assessment chart.

Science – We're Evolving – Spring 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Evolution and Inheritance Pupils should be taught to: - recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago - recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents - identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	**Pathway 3 Biology** Evolution and inheritance **L1** **L.O: I can explore what I know about evolution and establish my starting points for my new learning topic** **L2** L.O: I can explain the scientific concept of inheritance **L3** **L.O: I can summarise how plants and animals are adapted to their environment** **L4** **L.O: I can explain how adaptations can lead to evolution** **L5** **L.O: I can justify my understanding of evolution using evidence from fossils** **L6** **I can create an informative biography of an influential scientist, Charles Darwin** **Pathway 4 – Working Scientifically** To collect and present data in a variety of ways. I can research famous people. To observe closely. To perform simple tests. To identify and classify	**Adaptation** - the process of changing. **DNA** - carries specific genetic information inside every living thing. **Ecosystem** - a physical environment where things live. **Environment** - the surroundings in which a person, animal or plant lives. **Evolution** - a theory that states that all species that exist today developed from previous species. **Genetics** - inherited characteristics. **Inheritance** - something that has been passed on **Natural Selection** - when organisms that are best suited to their environment survive and pass on their **Trait** - a feature or quality belonging typically to a person, place, or thing and serving to identify them **Inherited:** the way that a trait or characteristic is passed to offspring from parents. **Adaptation:** a small change that a living thing goes through. **Natural selection:** a process in which living things adapt themselves in order to survive, that they don't have any control over. **Evolution**: Is change over time. **Fossil**: a living thing that has been turned to stone by one of several methods. **Dinosaur**: a particular kind of reptile that lived in prehistoric times. **Prehistoric:** the time classed as 'before history' as it was so long ago it hasn't been recorded or written.	L1- Retrieval 'KWL' task - learning log task and KWL chart for children to generate their own questions in which they would like to discover the answers to. Evolution and Inheritance vocabulary sheets to be introduced – children to traffic light assess understanding as they work through the unit. – What do they already know about evolution and inheritance? Pre-assessment test/ Learning log activity/KWL task. *Support LA reading through questions.* *L2* - Identify the differences between those in the class- general eye colour/ hair colour task. Discuss some of the ways that we can look at differences between each other, that aren't to do with things we can change, such as hair length, or colour, or how fat or thin we are, or whether we wear glasses or not. Explain that these are called environmental features. We are looking for inherited features. What does inherited mean? (Dictionary work.)Tallying up results on the board and chn to then generate a general statement to review their findings. **Use of David Beckham's family to observe similarities amongst them. Option for chn to select their own example if preferred. Use f chrome books to research this.** L3 -Studying the physical features of a variety of plants/animals, linking specifically to where their live- their habitat. Chn make simple observations on picture.. Find the Galapagos Islands on Google Earth/ Maps and display on the whiteboard. Turn 'photos' on and explore some of the images from around the islands. Describe and discuss what the islands look like, what kind of habitats can be seen. Show the film 'We're evolving' and ask children for examples of animals they have known who have given birth and can compare the characteristics of the offspring with the parents. L4 – Chn study the work of Charles Darwin and his expedition to research the differences in the beak size and shape amongst the finches in the Galapogus. Children write up an experience of them trying to collect up different sized chocolates. This can then be concluded against the findings of Darwin and the changes that occurred to the size and shape of the bird's beak. Chn make a link to the theory of evolution and how change occurs over time to ensure the survival of the species – in this case – successful eating of the chocolate. Write up support sheet provided. Sentence openers for the conclusion of their findings and to structure their justification answer. L5 - **Pair up:** Explain this is how real-life paleontologists dig up dinosaurs. One of the most famous is Mary Anning. Until 200 years ago people had found fossils, but they didn't realise they were from creatures that had lived millions of years ago. The work of Mary Anning was important in changing this. In groups, children plan a video or audio presentation about Mary Anning, her life and discoveries. L6 - Carry out research on Charles Darwin and his life. Use the information to produce a presentation about him and his life. Choose different ICT tools to create an audio or video presentation. Explain Darwin's theory about finches, which we can apply to birds we know already. Look at the interactive activity and consolidate knowledge. Option to record on chrome book JC/JP.

Science- Let it shine! – Spring 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Physics – Light Pupils should be taught to: • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast the	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	Pre- assessment task L.O: I can reason and explain how light appears to travel L.O: I can summarise how light is reflected L.O: I can explain and demonstrate how we see things using our eyes L.O: I can investigate why shadows have the same shape as the objects that cast them. Reading Task L.O: To answer questions in a complex non-fiction text about refraction National Science Day tasks – **Activity**: Children to produce an independent piece of work about Sir Isaac Newton and then will perform an investigation using a prism to alter a ray of light. Links to homework task to find facts on Isaac Newton. **Activity**: Fun with filters… children to design a secret message challenge using filters to read each others messages. Children to also take an end of topic quiz in learning logs.	**Iris** - Coloured circle around the pupil. It controls the size of the pupil **Pupil** - Black part of the eye. This is an opening that lets light in **Lens** - This focuses light onto the retina **Retina** - Light-sensitive layer at the back of the eye. It is made up of **rods** and **cones** **Rods** - Sense cells that help us see the shapes of things **Cones** - Sense cells that help us see colours **Optic nerve** - Carries messages from the retina to the brain. The brain turns these into an image of what we are looking at Isaac Newton	**Activity 1**: Children will complete an AFL activity pre-topic and a KWL grid which will be used weekly going forward.. Pre- assessment retrieval task complete. **(AM support LR, BS, LT, JC, JP to remain focused and for reading of questions where necessary)** **Activity 2**: Children will create a model of light and record their observations in an investigative piece of work.. Chn observe what happens to a ray of light, annotating a diagram using scientific vocabulary and create an explanatory passage to reason their understanding of how light travels. LA – Support giving a word bank including scientific vocabulary and a cloze activity to show their understanding. **Activity 3**: Children will makes notes on the process of reflection from video. They will use modelling clay and a slit in cardboard to shine a torch on an object and visualise what the reflection process involves. They create a definition to summarise the process. Optional task for assessment of understanding: Children will design a non-chronological report or leaflet on how light is reflected and could also design/construct their own model periscope. Periscope task to be completed in teams and an explanation of how it operates using the scientific terminology with accuracy. **Activity 4: Chn study the eye organ and look at how the parts work together to enable sight. Chn watch an interactive explanation and make notes to support their main task. They label and complete an explanation of each key part. LA- have a definition matching sheet to support them with their understanding./ recording.** **Can they create a flow diagram of how the eye works to be used in Science lessons in younger year groups? Extension task.** **Activity 5:** Children will plan, predict and produce an experiment to investigate how shadows change with distance. Children will make predictions, carry out the experiment and write results and a conclusion. EXTENSION – How reliable are your results? What made your result generate fair results? **Learning Log – Exit Quiz to be completed and re-visit KWL to add new learning.**

Science- Let it shine! – Summer 1

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Physics – Light Pupils should be taught to: • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	Continued.. From Spring 2.... Writing/ practical tasks – WHOLE CLASS/ INDEPENDANT L.O: I can investigate how refraction changes the direction in which light travels L.O: I can investigate why shadows have the same shape as the objects that cast them. L.O: I can write a diary in the role of a scientist (Isaac Newton) English: Reading Task L.O: I can answer questions in a complex non-fiction text about refraction L.O: I can skim and scan for key information in a text to make inferences and answer questions -Isaac Newton reading task	**Iris** - Coloured circle around the pupil. It controls the size of the pupil **Pupil** - Black part of the eye. This is an opening that lets light in **Lens** - This focuses light onto the retina **Retina** - Light-sensitive layer at the back of the eye. It is made up of **rods** and **cones** **Rods** - Sense cells that help us see the shapes of things **Cones** - Sense cells that help us see colours **Optic nerve** - Carries messages from the retina to the brain. The brain turns these into an image of what we are looking at Isaac Newton	**Continued...,** L1Chn read the non-fiction text identifying the key vocabulary linked to the unit – refraction. Discuss with partner/ teacher/ whole class the content and annotate where necessary. Chn answer questions independently and self-mark/ reflect upon answers where appropriate. Concept cartoon task used to assess and apply understanding. Chn complete a class investigation write up together using a shared write. Chn then complete one of two investigations following same format as whole class one with straw in a glass of water. Chn either complete amazing images or incredible straw investigation and prediction then explain what their findings conclude. L2 : Children will plan, predict and produce an experiment to investigate how shadows change with distance. Children will make predictions, carry out the experiment and write results and a conclusion. EXTENSION – How reliable are your results? What made your result generate fair result. Challenge – MS, OA, CP, ES, CS, RA, HB, LP, JH, AF. **L3Chn to read a text about Isaac Newton's scientific discoveries about colour. They must skim and scan for key information and then make inferences to answer SATs style questions with 2 and 3 marks. Discussion and highlighting about the text will support and challenge where necessary. Chn then use the facts to write a diary in the role of Isaac Newton outlining his findings about Science: colour spectrum.** **Learning Log – Exit Quiz to be completed and re-visit KWL to add new learning.** Possible extension **Fun Activity**: Fun with filters... children to design a secret message challenge using filters to read each others messages. Children to also take an end of topic quiz in learning logs.

Science- It's Electrifying – Summer 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Physics – Electricity Pupils should be taught to: • know the main circuit symbols and use these to draw circuit diagrams; • be able to plan and conduct an investigation; • plan an investigation based on the results of a previous investigation; • decide how to record data.	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	Continued.. From Summer 1 , Writing/ practical tasks – WHOLE CLASS/ INDEPENDANT report (piece L.O: I can investigate why shadows have the same shape as the objects that cast them. **Reading Link** **L.O: I can explain the importance of the major discoveries in electricity** **Writing link** L.O: I can write about the life of an influential scientist and the impact of their work in modern day **L.O: I can observe and explain the effects of differing volts in a circuit.**	Electrical wires with crocodile clips • Bulbs • Bulb holders • Batteries (a selection of batteries with different voltages) • Battery holders (single and double) • Buzzers • Motors • Switches	**Report piece:** Children will plan, predict and produce an experiment to investigate how shadows change with distance. Children will make predictions, carry out the experiment and write results and a conclusion. EXTENSION – How reliable are your results? What made your result generate fair result. L1 Children answer questions, recapping the key concepts they learnt in Electricity in Year 4. Children answer questions on the Are You an Electricity Expert? Activity Sheet and swap with a partner at the end of the quiz. History of Electricity: Children read and answer questions using the differentiated History of Electricity Reading Comprehension Sheets. Children focus on the main historical discoveries made in the field of electricity Biography it: Children complete the Great Scientists Mini-Biography on Thomas Edison, Nikola Testa, Alessandro Volta or Michael Faraday L2 What is a circuit? What parts do all circuits contain? Can you draw a circuit which includes a bulb? All children draw a circuit containing a bulb on a whiteboard. Battery or Cell? State that they will be learning the scientific symbols for parts of a circuit in this lesson. Explain that there are different drawings for 'battery' and 'cell' and highlight the differences between them. Scientific Circuit Symbols: Show children the symbols they would have used in Year 4 and explain that these were informal rather than scientific symbols. On the presentation, children match the informal and scientific symbols used to draw circuit diagrams. Show children the correct symbols. nterpreting and Drawing Circuit Diagrams: Using the differentiated Interpreting and Drawing Circuit Symbols Activity Sheets, children will label parts of a circuit and then convert circuit diagrams using informal pictures into a circuit diagram using scientific circuit symbols. L3 Current and Voltage: Watch this BBC video about current and voltage. State the main points related to current and voltage. How Many Volts? Allow children to examine a range of different batteries and check the number of volts each one supplies. Labelling Volts: Show children a circuit diagram with the volts labelled. Discuss the location of the label and how to label a battery containing multiple cells, as opposed to a single cell. What Difference Do the Volts Make? Make predictions together about what will happen to a bulb, motor or buzzer depending on the voltage of the cell or battery. Discuss what difference they would expect (e.g. bulb will get brighter, it will increase in brightness, the brightness will stay the same). Model one example using a bulb, including how to draw the circuit diagram of each step with volts labelled accurately. Observing the Effect of Volts: In mixed ability pairs, children obtain the appropriate equipment and record their observations and circuit drawings on the Volts Activity Sheet. L4 Wire Length: Does wire length affect how components in a circuit work? Children discuss the question with their talk partners and feed back. Planning Your Investigation: Outline the different types of scientific enquiries they can choose from. Address any misconceptions or errors. Investigation: All children select a type of enquiry and plan their investigation using the differentiated Electricity Investigation Activity Sheets. Children discuss the different variables with an adult and create a list. If possible, allow them access to the equipment to aid their planning. Children are given key words to support planning. Children formulate their own question. Peer Assessment: Children swap their investigations with a partner. Children read their partner's Electricity Investigation Activity Sheet and discuss if there are any improvements that need to be made.

Science- It's Electrifying continued – Summer 2

NC PoS	Key Concepts Link	Key Competencies	Vocabulary	Activity
Physics – Electricity Pupils should be taught to: • know the main circuit symbols and use these to draw circuit diagrams; • be able to plan and conduct an investigation; • plan an investigation based on the results of a previous investigation; • decide how to record data.	For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science. For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest. For children to begin to recognise how scientific concepts relate to their everyday lives. For children to be able to work scientifically in order to investigate using scientific principles. For children work collaboratively and independently to investigate scientific concepts	L.O: I can plan an investigation to understand variations in how components function L.O: I can investigate my results further.	Electrical wires with crocodile clips • Bulbs • Bulb holders • Batteries (a selection of batteries with different voltages) • Battery holders (single and double) • Buzzers • Motors • Switches	L4 investigation: Children given their Electricity Investigation Activity Sheet and given time to read and edit if necessary. Degree of Trust: Define what degrees of trust are. Discuss the different criteria. Which of these should you bear in mind while conducting your investigation? What will you do to ensure you can have a high degree of trust in your results? Conducting the Investigation: Discuss the important points relating to how the investigation should be conducted. Children to create a table to record their results before conducting the investigation. Reporting Findings: Children use the differentiated Electricity Reporting Activity Sheet to report their findings. Children explain one way they established a degree of trust when conducting their investigation. **Learning Log – Exit Quiz to be completed and re-visit KWL to add new learning.**

Science- SC1 Scientific enquiry lesson – Summer 2

NC PoS

Physics – Light

Pupils should be taught to:

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- **Use the idea that travels in straight lines to explain why shadows have the same shape as the objects that cast them**

SCI

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using scientific equipment, with increasing accuracy, taking repeat readings when appropriate recording data and results of increasing complexity
- 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

Non statutory National Curriulum link to the following suggestion:

- They might investigate the relationship between light sources, objects and shadows by using shadow puppets.

Key Concepts Link

For children to understand and have the **confidence** and **vocabulary** to discuss their knowledge and understanding of Science.

For children to develop an **enquiring mind** and desire to **independently investigate** and **research** scientific areas of interest.

For children to begin to recognise how scientific concepts relate to their everyday lives.

For children to be able to work scientifically in order to investigate using scientific principles.

For children work collaboratively and independently to investigate scientific concepts

Key Competencies

L.O: I can plan and carry out an investigation into the relationship between shadow size and position of a light source

Suggested question

How long is the shadow cast from a given object at specific distances from the light source?

Lesson following

L.O: I can analyse my data from an investigation to construct a line graph

Vocabulary

Variable
Fair test
Factors
Repetition
Reliable
Method
Apparatus
Enquiry
Conclusion
Prediction/ hypothesis
Light
Light source
Shadow
Reflective
Reflect
Mirror
Block
Direction
Transparent
Opaque
Translucent
Straight

Activity

CRIME LAB INVESTIGATION - SHADOW GIANTS - Background

The aim of the Challenge is to turn "them" into a light expert, who can help the 'UK Crime Lab' solve a crime. The Crime Lab has sent you over the crime report for the theft of a laptop at a Secondary School. Read what has happened (look at the Crime Lab report). For the challenge you will need to think and write out a specific enquiry question that you investigate.

Share the equipment and decide on variables (things that will stay the same and things that will change in your experiment).

Set the scene part 1

Have the room as dark as possible, with torches on shelves and desks, all pointing towards a 'briefcase'. Explain that they need to go through details of a crime that the 'UK Crime Lab' are hoping they are going to be able to help solve. Shoe the report to the chn. Use PPT 1 to structure lesson stages.

Tell ch we have been assigned to the shadown investigation.

Cut out the scaled suspects outlines and stick them on lolly sticks to create a series of shadow puppets. Give chn a set of puppets and torches per gp and as chn come in get them to play with them for 10 mins, explaining that this equipment was dropped off from the Crime Lab this morning, as it will be useful to analyse the next set of evidence. Can the chn work out which part of the evidence they will be exploring today and the significance of the 5 different puppets (to scale for the remaining suspects: 1cm = 10cm)

Retrieval task - **What is a shadow and how are they created?** Explore vocab e.g. opaque, transparent, translucent etc. Glue in the 3 line graphs and get chn to predict which one will be closest to their results.

Chn research through the witness statements about the shadows (evidence file) and note that one witness has said that they saw an odd shape on the shadow, which they described as being the shape of a car 'rear view' mirror on a stick, but are not sure. The Crime Lab would like chn to see if this is a possible explanation as, if they can, then this suggests that this is what was seen in the shadows - the Crime Lab will investigate this further and get a search warrant issued if chn think this is the case. Once chn have ascertained that it is possible to position a mirror in order to see what is behind them, get them to explain how they positioned the suspected mirror noted in the shadow and suggest why this would help our suspect. Explain that they now need to investigate who might have cast the shadows. Ask chn how one person could cast shadows of different lengths and definition - ensure understanding of the need for a light source and a 'block' to create the shadow. Ask chn if they know what we call something that light cannot travel through (opaque) as opposed to something that light can travel through, e.g. the windows (transparent). Explain to chn that something that is translucent allows some light through and will still create shadows; clarify that a shadow is an absence of light. Show chn 3 line graphs and get them to predict which one will be closest to their results.

Publish a conclusion based on findings and have a suspect discounted, 'beyond reasonable' doubt, one of the suspects. If there is time complete the 'rear view mirror' challenge, holding a mirror on a stick so that they can also see behind them as they look forward.