SCIENCE CURRICULUM

Spring 2 : EYFS – YEAR 6

SCIENCE CURRICULUM INTENT

The Aims of the National Curriculum for Science:

The national curriculum for Science aims to ensure that all pupils:

● develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics

● develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them

● are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Spring 2

EYFS	Focus of Study
FS 1 – Nursery **Milestones** N2 TM Understand the key features of the life cycle of a plant and an animal. (Sci) N1 Talk about what they see, using a wide vocabulary such as the different leaves they can see on welly wander N2 Children will recognise and name some common woodland animals: hedgehog, squirrel, rabbit, fox, badger etc. (Sci) Children will discuss that certain animals live in woodland/forests (UK) (Sci) N1 TM Show curiosity, appreciation and respect for living things.	**Context for study:** Simple lifecycles of chicks and beans. Woodland animals – identifying and sorting them accordingly. **Knowledge Content:** Children will know the lifecycle of a chick. Children will be able to name woodland animals and know that they live in woodland areas. **Science experiments.** To identify and sort animals into woodland and not woodland. To observe chicks hatching using incubator and how to keep chicks warm using a warming plate. **Key vocab will include,** lifecycle, hatching, incubation, woodland, fox, badger, rabbit, hedgehog, **Working Scientifically in EYFS** **Scientific Enquiry in EYFS** I know that chicks come from eggs. I know that a seed grows into a plant. I know that animals live in different places such as a woodland area. I can sort animals into woodland and not woodland animals. I can talk about the lifecycle of a chick.

<table>
<tr><td>F2 - Reception

Milestones
• Children will know that a plant is a living thing. (Sci)
• Children recognise that different plants and animals grow in different parts of the world. (Geog/Sci)
• Children can recognise and name parts of a plant. (Sci)
• Children understand how certain plants grow and correctly sequence the growth patterns. (Sci)
• Children notice and talk about the changes that happen to plants as they grow. (Sci)
• Children understand how certain animals grow and correctly sequence the growth patterns (Sci)</td><td>Context for study: To explore plant life and explore how animals and plants grow along with the sequence of the growth.
Knowledge Content: Children will identify certain plants and name parts of plants. Children will identify changes and sequences of growth in both plants and animals.
Key vocab will include <u>grow, change, sequence, stem, leaves, roots, care</u>
Scientific Enquiry in EYFS will include observing and recording changes in plants and animals along with growing own plants.
Working Scientifically in EYFS
I know that chicks like humans have a life cycle.
I know that for a seed to grow it needs water, food and sunlight.

I can talk about how plants and animals have life cycles.
I can identify different parts of a plant and name them.</td></tr>
<tr><td>Year 1</td><td>Focus of Study: Materials (extended unit)</td></tr>
<tr><td>NC Objectives</td><td>Key Explicit Knowledge and Vocabulary</td></tr>
<tr><td>Pupils will 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 properties of a variety of everyday materials.</td><td><u>Context for study:</u> This is a continuation from the previous materials unit with a focus on waterproof and magnetic materials. This extended unit hopes to embed properties of materials further as a prerequisite for the materials topic in Year 2. This extension unit adds to our broad, balanced and ambitious curriculum in Year 1. Begin with a re-visit of elements of materials from previous unit.

<u>Knowledge Content:</u>
Key Vocabulary: hard, soft, stretchy, brittle, shiny, dull, squashy, rough, smooth, bendy, waterproof, absorbent, transparent, opaque.

Know that waterproof means something that keep water out e.g. umbrella, rain coat, water bottle
Know examples of waterproof materials
Know that some materials made out of some metals are magnetic
Know some materials that are magnetic</td></tr>
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compare and group together a variety of everyday materials on the basis of their simple properties.	Know that some materials float when they are light (less dense) Know that some materials sink when they are heavy (dense) Know some examples of materials that float and sink **Working Scientifically** I can predict which materials will be waterproof. I can evaluate my shelter. I can test different materials. I can explain my results. I can use a sorting diagram to classify materials. I can ask questions to identify materials. **Scientific Enquiry** I can conduct a comparative test. I can identify and classify different materials. I can set up a comparable test. I observe what happens to the materials over a period of time. I can notice patterns in my results. I can use my subject knowledge to sort a range of objects.
Year 2	Focus of Study: **Animals inc. humans (see Spring 1)**
NC Objectives	**Key Explicit Knowledge and Vocabulary** **(Continuation from Spring 1)**

Year 3	Focus of Study: Light
NC Objectives	**Key Explicit Knowledge and Vocabulary**
Pupils should be taught to: recognise that they need light in order to see things	**Context for study:** This unit is the first of two science units where pupils learn about light as part of the discipline of physics - the study of the processes that shape our world and how we use it. Pupils have a secure knowledge of the terms opaque, transparent and translucent. They know what plants need, including light, to grow well and how energy from light is the start of a food chain.

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.	This unit builds upon pupils' prior knowledge of materials as they recognise that shadows are formed when an opaque object blocks the light from a light source. Pupils find patterns in the way that the size of shadows changes. In Year 3, pupils learn we need light in order to see things and that dark is the absence of light. New learning includes that light is reflected from surfaces and it can be separated into a prism of colours. Pupils learn that light from the sun can be dangerous and that there are ways to protect their eyes. This is the precursor to work studied in Year 6 as pupils learn how shadows are formed. The knowledge acquired in this unit will help pupils to understand how light travels in straight lines and how the amount of light entering the eye is controlled by the pupil. **Begin with a re-visit of elements of materials and plants (vocabulary: opaque, transparent and translucent) from Year 2.** **<u>Knowledge Content:</u>** The study of light is part of the discipline of **physics** - the study of the processes that shape our world and how we use it**.** Know that light is a form of **energy** Know that energy is needed to make things happen. Every movement or change, no matter how small, requires energy. Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another. Know that we need light to see things and that darkness is the **absence of light** Know that light travels in straight lines Pupils should know that we require **light** to see and that **darkness** is the **absence** of light. Know that light is **reflected** from **surfaces** (smooth, shiny surfaces reflect light more efficiently), and is not the producer of the light source itself. **Reflection** of light is when we can see the light on another surface. Other sources of light are all **man made**. Know that light reflects off objects and enters our eyes. This is how we see. Know that natural sources of light include - sun, stars, fire, lightning and **bioluminescence** in animals (such as fireflies) Know that there are man-made sources of light such as light bulbs, televisions, neon signs. Know that many light sources give off light and heat. Know that the Sun gives off light and heat

Know that **filaments** in traditional bulbs heat up until they glow, giving off light and heat
Know that **fluorescent** bulbs glow when electricity adds energy to a **gas** within the bulb
Know that looking directly at the sun is dangerous, as the light is too strong. Understand that **Ultraviolet (UV)** light causes **blindness or other long term vision problems** and that eyes should be protected by covering with either a wide brimmed hat / cap and sunglasses.
Know that a rainbow occurs when it is sunny and raining. Through teacher demonstration know that light can be **separated** with a **prism** into different colours. Know that white light consists of many different colours. These are - Red, Orange, Yellow, Green, Blue, **Indigo**, **Violet**. This is known as the **spectrum of colours**. This can be recalled with the **mnemonic** 'Richard of York Gave Battle In Vain' or ROY G BIV. Know that in a rainbow drops of rain act like a prism to create a rainbow. Know that sometimes double rainbows can occur. Rainbows occur when the sun is low in the sky.
Understand that shadows are formed when an **opaque** object blocks light from passing through. This means it **blocks** out the light. **Transparent** and **translucent** objects let light through, creating no clear shadows.

Term	Definition	Example of material
Opaque	You cannot see through it	Wood, stone, metal
Translucent	Some light can pass through it but you cannot see clearly through it	some glass, some plastic, tissue paper
Transparent	You can see through it clearly	glass, plastic, cling film

WORKING SCIENTIFICALLY

I can raise own questions when exploring materials and light.

I can make predictions based on scientific questions.

I can set up practical comparative tests using my own ideas.

I can record my results in a table.

I can interpret my results and report on patterns found.

	I can evaluate my test and suggest improvements. I can observe what happens when the puppet is moved closer to the light source. **<u>Scientific Enquiry</u>** I can compare I can spot patterns I can observe what happens over time I can carry out a fair test and control variables.
Year 4	Focus of Study: States of matter
NC Objectives	**Key Explicit Knowledge and Vocabulary**
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)	**Context for Study:** This unit is the fourth of five science units where pupils study **materials** as part of the discipline of **chemistry** - the identification of the properties a substance is made from. It is also the study of **forces** as part of the discipline of **physics** – the study of the processes that shape our world and how we use it**.** Pupils have a secure knowledge of the properties of materials and can identify and compare the suitability of a variety of everyday materials. Previous learning includes comparing how things move on different surfaces and pupils know that squashing, bending, twisting and stretching can change the shapes of some solid objects. Pupils have studied the work of John Dunlop, John MacAdam and Mary Anning. Pupils can compare and group different kinds of rocks on the basis of their appearance and simple physical properties. Pupils know how fossils are formed and recognise that soils are made from rocks and organic matter. This year 4 unit builds on pupils' knowledge of properties of materials as pupils learn about states of matter. Pupils compare and group materials together, according to whether they are solids, liquids or gases. New learning includes 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). Pupils. The knowledge acquired during this unit will help pupils understand the water cycle in geography: the part played by evaporation and associate the rate of evaporation with temperature. This unit is the precursor to work studied in Year 5 pupils learn about dissolving, mixing and changes of state, and reversible and irreversible changes. Pupils also build on previous

identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Maths N.C Statistics objectives: Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs.
(Use bar charts and time graphs when learning about the temperature at which different materials change state) **Power Maths, unit 14**

Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs
(Compare the difference in these temperatures through the interpretation of different graphs) **Power Maths, unit 14**

knowledge of magnetic and non-magnetic metals.
Begin with a re-visit of elements of from Rocks and Soils from Year 3 and materials from Year 2.

Knowledge Content:

The study of **changes of materials** is part of the discipline of **physics** - the study of the processes that shape our world and how we use it**.** It is also part of the discipline of **Chemistry** - the identification of the properties a substance is made from.

Know that everything is made up of tiny **particles**. The properties of a **substance** depend on what its particles are like, how they move, and how they are arranged.
Most substances can exist in three **states**: **solid**, **liquid** and **gas**. The particles of a substance are the same in each state, but their **arrangement** and movement change. This explains the different behaviour of a substance in its three states.
In a solid state the **vibrating** particles form a regular pattern. This explains the fixed shape of a solid and why it can't be compressed or poured.
In a **liquid** the particles still touch their neighbours but they move around, sliding over each other. This is why you can pour, but not **compress** (squash), a liquid.
In the **gas** state, widely-spaced particles move around **randomly**. This explains why you can compress gases and why they flow.

Identify the following solids, liquids and gases at **room temperature**. Know that room temperature means neither heated or cooled.

Solid (at room temperature)	Liquid (at room temperature)	Gas (at room temperature)
Wood Iron Copper Plastic	water milk blood oil	oxygen carbon dioxide nitrogen steam

	Know that air is a collection of gases (not a single gas) and it contains - 78% **nitrogen**, 21% **oxygen** and a small amount of other gases including **carbon dioxide**. Know that steam and **smoke** are not the same thing. Know that steam is water in gas form and that smoke comes from burning solid material. Know that when atoms are **heated**, the bonds between them break, allowing for solids to become liquids, and liquids to become gases. Know that when materials are **cooled**, bonds are created in air to form liquids, and bonds are strengthened and become rigid, creating solids from liquids. Know that water can exist in all three states. Know the information in the following diagram and be able to recreate it (use the word **water vapour** alongside steam) <u>Water Cycle (links with geography curriculum)</u> The study of the water cycle is part of the discipline of **physics,** (the hydrologic cycle) – the study of the processes that shape our world and how we use it**.** Know the term for each part of the water cycle: **evaporation, condensation, precipitation, runoff** Know that **evaporation** is when water changes from a **liquid** to **vapour** (**gas**) as a result of becoming hotter. Understand that water becomes vapour at **100 °C** as it is the **boiling point** of water. Know that we measure temperature using degrees Celsius (°C**)** Know that in many countries they use a Fahrenheit scale. Compare the two scales shown in the diagram above. Know that **condensation** is the name of the process when water vapour changes into liquid through **cooling.** Know that condensation also refers to the liquid as it appears on windows on a cold day. Know that as water condenses clouds form in the sky. When it is cool enough, and a vast amount of water has formed, it falls in the form of rain and is called **precipitation**. Understand that water will change from a liquid to a **solid** when cooled to 0°C and that this is the **freezing process**. When ice melts, it becomes liquid which becomes part of the water cycle again. Know that about 70% of the earth's surface is water.

	Know that about 96% of earth's water is stored in the oceans. Know that the remaining 4% is stored in rivers, lakes, ice caps, glaciers, water vapour in the air, in the soil and even in animals. **<u>WORKING SCIENTIFICALLY</u>** I can make careful observations and identify similarities and differences. I can make predictions using straightforward evidence and observations. I can use a thermometer to take accurate measurements (observe closely to nearest degree) I can interpret what I have observed using my own scientific knowledge. I can set up tests to answer questions. I can record using diagrams what I know about the water cycle **<u>Scientific Enquiry</u>** I can compare and group materials depending on their properties I can look for patterns I can construct a fair test I can observe over time I can carry out a fair test and identify the change and measure factor I can observe the water cycle over time

Year 5	Focus of Study: Earth & Space (See Spring 1)
NC Objectives	**Key Explicit Knowledge and Vocabulary**
	(Continuation from Spring 1)

Year 6	Focus of Study: Evolution and Inheritance
NC Objectives	**Key Explicit Knowledge and Vocabulary**
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.	**Context for study**: This unit is the first science units where pupils learn about evolution and inheritance. This unit comes after pupils have studied a variety of living things in their local and wider environment. Pupils know species of animals and plants, how they are adapted to suit their environment and that adaptation may lead to evolution. Pupils can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Pupils have secure knowledge of the seven life processes, the requirements of plants for life and growth and food chains. In this unit, pupils revise and further develop their knowledge of the functions of the different parts of flowering plants related to reproduction. In Year 6, pupils learn that sexual reproduction in plants happens in a cycle-like pattern: germination, pollination, fertilization and seed dispersal (Year 3 revision). This unit builds on pupils' previous knowledge of the classification of living things. In Year 6, pupils describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. Pupils learn about plant taxonomy- the science that finds, identifies, describes, classifies, and names plants. Pupils learn about the modern classification system created by Carl Linnaeus and that each species is given a name using Latin words which links to the Year 5/6 Latin curriculum. Pupils are introduced to the taxonomic hierarchy in relation to the red fox which is the precursor to work pupils will study in KS3. During this unit, pupils also learn about the important role bees play in pollination in our ecosystem, understand why the global bee population is in decline and the need for conservation to maintain bee populations for the future. **Begin with a re-visit of elements of Living things and their habitats from Year 4/5.** **Knowledge Content** The study of **evolution** and **inheritance** is part of the study of **biology** - the study of living **organisms.** Know that **characteristics** are passed from parents to their **offspring**. Use the example of different **breeds** of dog (including what happens when **Labradors** are crossed with **poodles**).

	Know that **variation** in **offspring** over time can make animals more or less able to survive in particular environments e.g. the development of **insulating** fur on the **arctic fox**. **Charles Darwin** Know that Darwin lived from 1809 - 1882 and is known for his theory of **evolution**. Know that Darwin studied animals and plants (a biologist) and developed the idea of **natural selection** to explain how different species had evolved over time. Know that he explained his **theory** in his most famous book '**On The Origin of Species**' Know that his theory was formulated whilst studying animals on the **HMS Beagle** voyage between 1831 and 1836 including the **Galapagos islands.** Know that Darwin said 'A man who dares to waste one hour of time has not discovered the value of life' Know that **natural selection** is the process in which populations of living things adapt and change. Individuals in the population of an organism have traits which are better suited to the environment in which they live and are therefore more likely to survive. These individuals then pass the desirable traits to their offspring and over time these become more common within the population. Know that the theory of evolution states that evolution happens by **natural selection** through the following process The Process of Evolution 1. More organisms are born than can survive. 2. These individuals all have slight **variations** between them. 3. Some of these variations are helpful and improve an organism's chance of **survival** 4.Those that survive pass their **characteristics** onto their **offspring**. 5. Over time these helpful variations are passed on to the next **generation**. 6. This process takes thousands of years and can't be seen from one generation to the next. Know the term **inheritance** as 'the passing on of characteristics from parent to offspring' Know that offspring can inherit characteristics from their parents through genetics.

	Know that Genes determine what eye colour, hair colour, height and even things like ear lobe shape. These are called **inherited characteristics.** Some inherited characteristics can be altered such as dying your hair or having plastic surgery. **Know that acquired characteristics** are not inherited they involve changes to the structure or function of a living thing during its lifetime. They could include making muscles stronger by going to the gym or an injury which causes a change. Know the story of Darwin's finches and how the shape of their beaks helped Darwin to develop his theories. Know that in biology, an **adaptation** is defined as '*the process of change by which an organism or species becomes better suited to its environment*.' **Fossilisation** Know that **extinct** means no longer in existence Know that **fossilisation** is the process that forms fossils. Know that a fossil is 'the remains or impression of a prehistoric plant or animal **embedded** in rock and preserved in **petrified** form' Know that **prehistoric** means 'before written history'. Know that **preserved** means 'to keep something as it is'. Know that **petrified** means 'change into stone' Know that an **ammonite (a-muh-nite)** is a **mollusc** that lived in the sea over 65 million years ago. Know what an ammonite fossil looks like and identify them from images of fossils. Know these dinosaur names and identify from images - **Tyrannosaurus Rex, Brachiosaurus, diplodocus, stegosaurus, triceratops, iguanodon, velociraptor**. Know the term dinosaur comes from the Greek word deinos (terrible) and sauros (lizard) which, put together, makes 'terrible lizard.' Know that dinosaurs are actually **reptiles** not lizards. Know that a **pterodactyl** is not regarded as a dinosaur although lived at the same time. **<u>WORKING SCIENTIFICALLY</u>** I can use ideas from secondary sources to support my ideas.

	I can raise questions about a range of phenomena I can develop predictions not based on results of a scientific enquiry but using own ideas and subject knowledge. I can focus on scientific reasons for overall patterns rather than comparisons. I can use scientific diagrams and labels to explain abstract concepts. I can describe and evaluate my own and other people's scientific ideas supported by evidence. I decide which secondary sources will help to answer my questions. **<u>Scientific Enquiry</u>** I can identify scientific evidence that has been used to support or refute ideas or arguments I can talk about and explain my research using scientific knowledge and understanding I can identify patterns I draw valid conclusions when sorting and classifying. I can present my findings including explanations in oral and written forms.