Science Progression Document

Year 3

Topic 1: Chemistry **Rocks** **Key Question: What are the properties of materials and how can they be changed?**	**Prior learning**: **KS1** – Rocks and soils are only covered briefly in other topics in KS1. Children will have learnt about soil during plant topics. Children will have also learnt some of theproperties of rocks during topics about different materials. **Future Learning:** **UKS2 –** Rocks and soils are not studied again in KS2. **KS3 –** Children will study rocks in more detail. They will look at the rock cycle and how the different rocks are formed.	**Vocabulary:** Rock Soil Fossil Appearance Property Igneous Sedimentary Metamorphic	**Cross Curricular links:** **Geography:** the Earth's crust
Children should know…	**Key Questions:**	**Recap:**	**I am thinking like a scientist…**
Rock is a naturally occurring material found in the ground. Rocks can be different shapes and sizes.	What are rocks?	What do you know about rocks/soil?	**Make comparisons** between different rock types. **Observe** a selection of rocks and **compare.**
There are different types of rock in each groups e.g. sandstone, slate, marble etc.. which all have different properties e.g hard, soft, grain/crystal size, absorbent.	Are all rocks the same?	What is rock? Can you name any?	**Use tables** to record and compare the properties of different rocks. **Plan, make predictions and carry out fair tests** into the properties of rocks.
Rocks can be organised into 3 groups: igneous, metamorphic, sedimentary.	How are rocks formed?	Match features of rock	**Explain** how different rocks are formed using models and diagrams to support.
Soil is made from rocks and organic matter; there are different types of soils.	What's in soil?	3 Main groups of rock. Match rock to rock type.	**Observe and identify** components of soil samples. **Choose the most suitable method** to explore the water retention of soils and **present findings in a bar chart**.
Fossils are formed when things that have lived are trapped within rocks.	What is a fossil?	What is soil made of?	**Use labelled diagrams** to explain how fossils are formed.
The life and work of Mary Anning	Who is Mary Anning?	What is a fossil and how are they formed?	**Carry out research** into the life of Mary Anning.

Misconceptions:
Children may think that all rocks are the same and all soils are the same. Children may not know that rocks are formed over time, they might just think that they have always been there. Children may not think that the Earth is made fully of different types of rock. Children may struggle to grasp that the centre of the Earth is molten rock as they will only understand rocks as being hard and strong

Key vocabulary to Explain (Pre-Teach):

rock – a solid material that makes up the surface of the Earth
soil – a black or dark brown material on the upper layer of the Earth where plants grow
fossil – the remains of a prehistoric animal embedded in rock
appearance – what something looks like
physical properties – a characteristic of an object

Stretch and challenge:

- explore rocks in the local area (link to geography)
- observe rocks in different buildings and other objects (like gravestones) and investigate how they may change over time
- investigate similarities and differences of different soils
- investigate which soil is best to grow plants in
- explore the different types of living things that are found as fossils

1. Match materials with their properties.
2. Basic needs of living things.

Topic 2: Physics **Forces** **Key Question: What is friction and how does it affect moving objects?** **Why do magnets repel/attract?**	**Prior learning** Year 2 - Children have explored different forces before, during the 'Uses of everyday materials' topic in Year 2 whilst investigating how some materials can be changed by bending, squashing, twisting and stretching. They may be able to link those movements to simple pushes and pulls. Magnets are not studied at all in Key Stage 1. **Future learning:** Year 5 - Children will build upon their knowledge of simple pushes and pulls from Y3 by exploring more difficult concepts such as gravity, friction and air resistance. They will also create different size forces using mechanisms such as levers and pulleys. Magnets are briefly looked at again in Y5 'Properties and changes of materials', where they compare and group materials based on their response to magnets	**Vocabulary** Force Friction Magnet Contact Non-contact Attract Repel Magnetic Non-magnetic Iron	**Cross Curricular links:**
Children should know…	**Key Questions:**	**Recap:**	**I am thinking like a scientist…**
A force can be a push or a pull. A force can change the motion or shape an object.	What is a force?	What do you know about forces? What can you do to these objects for it to change shape?	**Make observations** of a variety of forces in action. **Use diagrams** to label forces and to support a scientific definition.
Friction affects the way things move on different surfaces.	What is friction?	What is a force? Can you name any?	**Plan and carry out a fair test** into the effect of different materials on a moving object.
Magnetic forces can act at a distance and do not need to make contact unlike some other forces.	What is a magnet?	What is friction? Give examples.	**Use diagrams** to explain what a magnetic force is. **Demonstrate** magnetic attraction.
Magnets attract or repel each other and attract some materials and not others.	Which materials are magnetic?	What is a magnet? Describe what it can do.	**Investigate and observe** how different materials respond to a magnet. **Draw conclusions** about magnetic materials.
Magnets have a North pole and a South pole.	Do magnets attract each other?	Identify magnetic objects.	**Investigate and report** what happens when different poles of a magnet face each other.
The life and work of William Gilbert (Magnetism and electricity)	Who is William Gilbert?	How do magnets attract each other?	**Research** the life and work of William Gilbert.

Misconceptions:

Children may think that **all metals are magnetic**. This is false, as only iron, nickel and cobalt are magnetic. Children might think that **all silver-coloured objects are attracted to a magnet**. This is not true, as aluminium is silver in colour but is not attracted to a magnet. Children might think that **bigger magnets are stronger than smaller magnets**.
This is not true, as the size of the magnet is not directly related to its strength.

Key vocabulary to Explain (Pre-Teach):

force – a push, pull, twist or turn caused when two objects interact with each other**magnet** – an object or device that attracts iron or another magnetic material **contact** – touching
non-contact – not touching
attract – pull towards
repel – push away
magnetic– attracted to a magnet
non-magnetic – not attracted to a magnet
iron – a metal that can be made into a magnet

1. Types of animal groups and features
2. Plant structure/lifecycle

Stretch and challenge:

- Design a poster to explain the difference between a push and a pull or contact and non-contact force.
- Create a glossary of the scientific vocabulary they have learnt throughout the unit.
- Use force meters to measure the attracting force of the magnets.
- Research how magnets are used in everyday life and write an explanation text to explain why magnets are important.
- Be introduced to friction to explain how objects move on different surfaces (this is not introduced until the Year 5 Forces unit).

Topic 3: Biology **Animals including humans** **Key Question:** **How can a balanced diet effect the muscular system?**	**Prior learning:** **Year 1** – Children looked at how to group animals including based on their diet. **Year 2 –** Children studied animals and their offspring and the basic needs that animals need to survive. **Future Learning:** **Year 4** – Children will recap grouping animals in different ways based on their features, nutrition and skeleton. They will also create classification keys based on their study. **Year 5** – Children will explore how humans change over time. **Year 6** – Children will learn about the impact exercise, diet, drugs and lifestyle have on the human body as well as learning about how water and nutrients are transported around the body. **KS3** – Children will study the skeleton and muscles in more depth including biomechanics where they will investigate the interaction between the muscles and bones. They will also study nutrition in more depth looking at the requirements for a healthy diet, calculations for energy requirements and the consequences of imbalances.	**Vocabulary** Nutrition Skeleton Muscles Healthy Unhealthy Diet Bones Vertebrate Invertebrate	**Cross Curricular links:** PSHE- the importance of a balanced diet and exercise for maintaining a healthy body
Children should know…	**Key Questions:**	**Recap:**	**I am thinking like a scientist…**
Animals, unlike plants which can make their own food, need to eat in order to get nutrients they need. Food contains a range of different nutrients that are needed by the body to stay healthy – carbohydrates including sugars, protein, vitamins, minerals, fibre, fat, sugars, water.	What is a balanced diet?	Animal groups and basic needs.	**Classify** foods in a range of ways. **Pose a line of enquiry** and then use food labels to find results and the present findings.
Humans (and other vertebrates) have skeletons (made up of a variety of bones)	What is a skeleton?	Balanced diet	**Identify** some of the main bones of the human skeleton.

which help them move and provide protection and support.			**Explain** why we need bones and the function of some main bones. **Investigate** the size of different bones by posing a question.
Different animals have different skeletons and some animals have no skeleton at all.	Can you identify an animal from its skeleton?	Skeletons/ basic needs	**Compare and contrast** the skeletons of different animals.
Humans have a variety of different muscles that they need for support, protection and movement.	Why do we need muscles?	Animal skeletons	**Use a model/diagram to demonstrate** how muscles in the arm work. **Use reference books and the internet** to find the names of some of the main muscles in the body.
The life and work of Willhelm Rontgen – invented the X-Ray.	Who is Willhelm Rontgen?	Muscles	**Research** the life and work of Willhelm Rontgen.

Misconceptions:

Children may have misconceptions about the bones in our body and where they are. They may think we have fewer bones and that the bones do not cover our whole body. Children may also think that animals have the same skeleton as humans. Children may have misconceptions about muscles. Some children think that only males have muscles but children need to understand that all humans have muscles in order to move. Children may have misconceptions about the word diet. We need to explain that a diet just means what an animal eats e.g. a shark's diet is smaller fish. Some children may have heard this term used when people want to lose weight.

Key vocabulary to Explain (Pre-Teach):

nutrition – food or nourishment
skeleton – the framework of bones that supports the body of an animal
muscles – a bundle of tissue in the body of an animal that can contract enabling movement healthy – good for your health
unhealthy – not good for your health diet – the food that an animal eats bones – a solid part of the skeleton
vertebrate – an animal with a backbone (spine) invertebrate - an animal without a backbone (spine)

1. What do plants need to grow?
2. Adaptation to habitats

Stretch and challenge:

- investigate their own questions based on the investigation in Lesson 2
- make up a song/poem/rap to help them remember the names of the bones
- make a model to show how the muscles work
- design a healthy packed lunch/meal that has each food type
- research other animals that have similar/different skeletons than humans
- research the use of muscles in other animals

Topic 4: Physics **Light** **Key Question:** **How does the eye work?** **How does light travel?** **How are shadows formed?**	**Prior learning:** **KS1** - Children do not study light as a separate topic. However, as part of seasonal changes topic, children will have observed and talked about changes in the weather and the seasons and will have talked about the dangers of looking at the Sun directly. **Year 2** - children might have observed the effect of light on plant growth. **Future Learning:** **Year 6** - children will consolidate previous learning by exploring the way that light behaves, including light sources, reflection and shadows. Pupils will make predictions and investigate the relationship between light sources, objects and shadows and understand how the eye works. Children could extend their experience of light by looking at rainbows, prisms, colours in soap bubbles, colour filters and bending light in water (although they don't need to explain why these phenomena occur at this stage). **KS3** – Children will learn that human sight is based on the ability to see red, blue and green light and that the colour of an object depends on the colours of light that it absorbs and scatters. Light travels at 300 million metres per second in a vacuum and different colours of light have different frequencies. The path that light takes can be bent (refracted) and that transparent materials can be shaped into lenses and prisms to alter the path of light by refraction (convex and concave lens). The ray model can describe the formation of an image in a mirror and how objects appear different colours.	**Vocabulary** Light source Dark Reflect Shadow Opaque Translucent Transparent Luminous	**Cross Curricular links:** PSHE: Road safety awareness (reflective clothing)
Children should know…	**Key Questions:**	**Recap:**	**I am thinking like a scientist…**
Light is needed to see things and dark is the absence of light. There are natural and man-made light sources.	What is a light source?	What do you know about the sun?	**Provide examples** to match scientific definitions i.e. light source, light, dark.
Light is reflected from surfaces and some materials are more reflective than others.	Why are some materials shiny?	Light sources	**Investigate** the visibility of different materials (shiny/matt) in darker environments and **draw conclusions.**

Light from the sun can be dangerous and there are ways to protect our eyes and skin from sun damage.	Is the Sun dangerous?	Refelctive/non-reflective	**Research** the dangers of the sun and how to stay safe and **present findings.**
A shadow is formed when the light from a light source is blocked by an opaque object. Shadows take on the shape of an opaque object. Some reasons why the size of shadows changes (proximity and angle of light source).	What is a shadow? Can you change your own shadow?	The sun and its affects	**Use diagrams and models** to explain how shadows are formed and why their appearance can change. **Observe and describe** what happens to shadows when the angle of proximity of the light source changes.
The shadows of transparent, opaque and translucent materials vary.	Do transparent objects have shadows?	Shadows	**Classify** materials according to opaque, translucent, transparent. **Observe and identify** the difference in shadows of translucent, transparent and opaque objects.
The life and work of Ibn Al-Haytham – Astronomer.	Who is Ibn Al – Haytham.	Transparent, opaque, translucent	**Carry out research** into the life of Ibn Al-Haytham.

Misconceptions:
Children may think that the Moon and other shiny/reflective objects are light sources as they appear to shine however, they are not. The Moon reflects light from the Sun (it does not give off its own light)
and cat's eyes, mirrors, reflective material on clothing also only reflect light (they are not light sources).
Children may think that you see things because light comes out of your eyes.
Misconceptions about shadows often centre around the position of the object, light source and shadow. The shadow always forms on the opposite side of the object from the light source; the shadow is a
similar shape as the object and the base of the shadow always touches the object.

Key vocabulary to Explain (Pre-Teach):
light source - something that emits light
dark - the absence of light
reflect - a surface (or body) that throws back light without absorbing it
shadow - an area where direct light from a light source cannot reach due to obstruction by an object
opaque - opaque materials do not let any light pass through them. They block the light
translucent - translucent materials let some light through, but scatter the light in all directions so that they cannot see clearly through them
transparent - transparent materials let light pass through them in straight lines so that you can see clearly through them
luminous - giving off light, bright or shining

1. Food Chain
2. Balanced Diet

Stretch and challenge:

Answer questions about which objects are light sources, explaining their reasoning
Use a range of diagrams to communicate scientific understanding about how we see objects and how shadows form.
Explain why wearing sunglasses is important to protect your eyes
Draw conclusions; answer questions and describe the relationship between the height of a light source and the length of a shadow

Topic 5: Biology **Plants** **Key Question:** **What is the lifecycle of a plant?** **What is the function of the different parts of plant/flower?**	**Prior learning:** **Year 1** – Children learnt about different plants and trees and described the basic structure. **Year 2** – Children studied how plants grow from seeds and bulbs in more detail. They will also look at what plants need to grow and stay healthy. **Future Learning:** **Year 5** – Children will look at the life cycle of a plant including the life process of reproduction. **KS3** – Children will study plants in much closer detail, observing the cell structure and how plantscreate their own food through photosynthesis.	**Vocabulary** Plant Tree Flower Roots Stem Leaf Seed Bulb Nutrients Pollination Formation Dispersal	**Cross Curricular links:** PSHE: Looking after the world we live in
Children should know…	**Key Questions:**	**Recap:**	**I am thinking like a scientist…**
The functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	What do the different parts of the plant do?	Parts of a plant. What plants need to survive. Life cycle.	**Observe** a variety of real life plants and look closely at the different parts. **Produce labelled diagrams** of flowering plants and use **scientific vocabulary** to describe function
Healthy plants need air, light, water, nutrients from soil and room to grow	What do plants need to survive?	Functions of parts of plants.	**Plan and carry out a fair test** with different variables e.g. the best conditions for a plant to grow. **Observe and describe** what happens to plants over time when they are deprived of light/water/air.
How water is transported within plants	Why are roots important?	What do plants need to survive?	**Use diagrams** to support an explanation of the purpose of roots.
The part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	How do plants reproduce?	Root importance/ key vocab.	**Observe** flowers carefully (look at reproductive parts) and produce **labelled diagrams.**

			Explain how a flowering plant reproduces using **demonstrations and models.** **Research and explain** the different ways seeds are dispersed using different presentation techniques.
The life and works of Ahmed Mumin Warfa – Somali (Botanist)	Who is Ahmed Mumin Warfa?	Life cycle/ Seed dispersal	**Research** the life and work of Ahmed Mumin Warfa.

Misconceptions:
Children may not realise that plants are living things and that they can die. They may only think things with faces and brains are alive. Children may not know that plants have roots in the ground that help the plant. Children may think that all seeds look the same so we need to make sure that we allow them to explore and observe a variety of seeds and bulbs.

Key vocabulary to Explain (Pre-Teach):

plant – a living organism
tree – a woody plant
flower – the seed bearing part of a plant that is usually surrounded by brightly coloured petals **roots** – the part of the plant that attaches into the ground for support and nutrient collection **stem** – the main stalk of a plant
leaf – part of a plant that is typically flat and hangs off the stem
seed – a small part of a plant that can grow another plant
bulb – a fleshy base of a plant that can grow another plant
nutrients – something that provides nourishment to a living thing**pollination** – the transfer of pollen to allow fertilisation
formation – to create
dispersal – to distribute or spread over a wide area

1. Properties of materials
2. What is hygiene?

Stretch and challenge:
- plant a variety of different plants and compare what they look like and how they grow
- take part in looking after the school garden/allotment (if you have one)
- invite a gardener in for the children to ask questions
- look at seeds of different fruits
- investigate seed dispersal in different plants
- investigate the best way to disperse seeds
- act out seed dispersal