Year 5/6 Science: Chemistry – Materials, filtering, changes **Autumn Term Year B**

Working Scientifically:

Which nappy is the most absorbent? **(fair test)**

Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains? **(comparative test)**

Grouping objects into transparent, translucent and opaque materials **(identifying, grouping and classifying)**

Enrichment:

Science Bus (Malton Secondary School)

Prior Learning:

- 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.
- 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.

Key Essential Skills and sticky knowledge:

- An electrical conductor lets electricity pass through it. They are often metal (e.g. iron, copper and gold) but also include carbon and water.
- An insulator doesn't let electricity pass through it, e.g. wood, leather, plastic.
- Materials can be grouped on the basis of their properties: hardness, solubility, transparency, conductivity (electrical and thermal) and response to magnets
- When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution.
- Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.
- Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation.
- When a mixture cannot be separated back into original components, this is called an irreversible change (eg burning, acid on bicarbonate of soda)
- Materials are used for a particular purpose, with scientific reasons

Topic Vocabulary:

solution, soluble, insoluble, solubility, transparency, dissolve, conductor, conductivity, insulator, filtering, separate, reversible, irreversible , absorbent, thermal

Sequence:

How can we compare and group together everyday materials on the basis of their properties?
Which material makes the best insulator?
Can we reverse (separate) mixtures and solutions?
What happens to a material when it is dissolved?
Are all changes reversible?

Thinking Deeper: How have materials had an impact on our environment? With this in mind, what type of materials can you envisage being invented in the future? What do we need to meet our daily needs and prevent the pollution we currently see?

Books/Resources:
George's Marvellous Medicines - Roald Dahl
The Wizards of Once - Cressida Cowell

Links:

- Subject Specific links – Maths - measuring
- Personal Development – Teamwork – working in groups to perform investigations
- SMSC – Considering how the materials we use can have an impact on our planet
- Cultural Capital – Developing an understanding of how different objects in our world work through investigations
- Careers – Chemist, Inventor
- British Values – Mutual respect – respecting the planet, respecting others' ideas, democracy – link to ideas about plastic pollution
- Equality – Within class/group work – every one having opportunity to participate
- Independence – Independent working
- Forest School

Year 5/6 Science: Biology - Evolution and Inheritance **Spring Term Year B**

Working Scientifically:

Bird beak buffet - *Are there any patterns between birds' beaks and the foods they eat?* **(pattern spotting)**

Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different **(identifying, grouping and classifying)**

Can you classify these observations into evidence for the idea of evolution, and evidence against? **(identifying, grouping and classifying)**

Enrichment:

Yorkshire Fossil Festival

Prior Learning:

- Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock
- Recognise that environments can change and that this can sometimes pose dangers to living things.

Key Essential Skills and sticky knowledge:

- Fossils are the remains of living things which are found in layers of rock. They tell us about living things that inhabited the earth millions of years ago and help us to understand the process of evolution.
- Animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
- Charles Darwin's theory of evolution explains how every living thing is connected in a family tree that stretches back billions of years to the beginning of life on Earth.
- Variation between individuals in a species can be caused by inheritance or environmental factors.
- Variation in offspring over time can make animals and plants more or less able to survive in particular environments.

Topic Vocabulary:

inheritance, characteristics, variation, DNA, adaptation , palaeontologist, descendants, breeding, offspring, selective breeding, evolution, extinction, genetic, species

Sequence:

- What is evolution?
- How are we different? How are we the same?
- How are living things adapted to their environment?
- How do living things change?
- How did humans evolve?
- Why are fossils so important?

Thinking Deeper:

Considering the current changes How do you envisage humans evolving in the future?

Books/Resources:

Wonder (Does everybody look the same?) - R.J Palacio
Charles Darwin On the Origin of the Species - Sabina Radeva
What Mr Darwin Saw - Mick Manning
One Smart Fish - Chris Wormell

Links:

- Subject Specific links – History – theories of evolution/creation
- Personal Development – Working within teams to research and present to an audience

- SMSC – Cultural understanding about why people and animals in different places develop different cultural traits
- Cultural Capital – Awareness of the people around us and the wider world and some of their differences
- Careers – Famous Scientists, David Attenborough, Palaeontologist
- British Values – Respecting our environment and understanding things we do can impact upon it
- Equality – Linked to why people differ in appearance, equality between people of different backgrounds and cultures
- Independence – Independent working
- Community – Differences between us
- Outdoor learning – Forest School

Year 5/6 Science: Biology – Living things and habitats Summer Term Year B

Working Scientifically:

Using keys and computer programmes to classify a range of living things **(grouping and classifying)**

Research unfamiliar animals and plants and decide where they belong on a classification key (work of Carl Linnaeus) **(researching using secondary sources)**

Do all flowers have the same number of petals? **(pattern spotting)**

Growing plants from cuttings, tubers and bulbs **(observation over time)**

Producing a biography about a naturalist **(researching using secondary sources)**

Compare this collection of animals based on similarities and differences in their lifecycle **(identifying, grouping and classifying)**

Enrichment:

Prior Learning:

Notice that animals, including humans, have offspring which grow into adults.

Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

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.

Key Essential Skills and sticky knowledge:

- All living things go through 7 life processes: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition.
  Reproduction is when an animal or plant produces one or more individuals similar to itself.
- Sexual reproduction requires two parents with male and female gametes (cells). It will produce offspring that is similar to but not identical to the parent.
- Asexual reproduction will produce offspring that is identical to the parent. It requires only one parent. Pollination occurs when pollen from the anther is transferred to the stigma by bees and other insects.
- The life cycles of mammals, birds, amphibians and insects (including reproduction) have similarities and differences. One difference is that amphibians and insects go through the process of metamorphosis. This is when the structure of their bodies changes significantly as they grow.
- Living things are divided into five kingdoms: animal, plant, fungi, protist (organisms and algae) and monera (bacteria)
- The five kingdoms can be broken down into smaller groups based on characteristics
- Carolus Linnaeus is the father of taxonomy, which is the system of classifying and naming organisms.
- A classification key is a set of questions about the characteristics of living things.
- Living things are classified mainly to avoid confusion, to make study of them easy and learn how they are related to each other

Topic Vocabulary: behaviourist, naturalist, life processes, stigma, stamen, sexual reproduction, asexual reproduction, pollination, germination, micro-organism, species, fungi, bacteria, algae, classification, taxonomy, fertilisation, monera, protista

Sequence:

- **What are the 7 life processes?**
- **What is a lifecycle and do all animals follow the same life cycle?** (Order lifecycles of animals/Compare animal lifecycles/Describe the link between life cycles and food needs/habitats)
- **Do all mammals have the same life cycle?** (Compare the growth rate between humans and dogs/Compare the age at which they are fully grown, average life span etc.)

- **How can a plant reproduce? (**Dissect and annotate a flower/Draw a life cycle diagram/Explore and compare pollination types)
- **What affects reproduction in plants? (**Investigate: How do seeds stick to animals for dispersal? Complete a fair test: How does the weight/propeller size effect Sycamore seed dispersal?)
- **What is classification and What is Carl Linnaeus well known for?** (What Are Microorganisms?/How are microorganisms classified?/How can things in the local habitat be classified?)

Thinking Deeper:

How might environmental issues have an impact on plant and animal life cycles?
Children create a field guide for designated areas of the school grounds. They then present their guides to other children.

Books/Resources:

- A year of Nature Poems - Joseph Coelho
- The Children of the New Forest - Frederick Marryat
- The Boy in the Tower- Polly Ho-Yen
- Cayote Summer - Mimi Thebo
- Cats - T.S Elliot
- Tyger, Tyger- William Blake

Links:

- Subject Specific links – English – speaking and listening – delivering a presentation; Computing – creating a key for classification; Maths – weight, length, comparing growth rates
- Personal Development – to be aware of harmful organisms and how to keep themselves safe; working collaboratively with others
- SMSC – creating awe and wonder discussing the amount of species on Earth and the amount we have discovered and classified; respect for living things
- Cultural Capital – broadening knowledge about scientists and the impact they have upon our lives, even those from the 17th Century; widening knowledge about a variety of living things and different countries some originate from.
- Careers – microbiologists, botanists, zoologist, marine biologist, medical scientist, naturalists, cook.
- British Values – respect for the environment when looking in the school grounds for organisms taking care not to destroy the habitat; mutual respect for all living things, understanding the legal age of an adult in England
- Equality – feeling a sense of belonging in the wider school whilst delivering a presentation to another class; diversity of living things, equality of humans/same life cycle despite different cultural backgrounds
- Independence – independent working
- Outdoor learning – Forest School

Year 5/6 Science: Physics - Light **Summer Term Year B**

Working Scientifically:

Investigating the effect of different light sources and objects and the shadows produced **(comparative tests)**

How do shadows change during the day? **(observation over time)**

How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? **(fair test)**

Enrichment:

Forest Schools

Prior Learning:

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 changes

Key Essential Skills and sticky knowledge:

- Light is a form of energy made up of photons, which allows us to see things.
- Light travels very quickly and appears to travel in straight lines (rays) but when passing through transparent materials such as water and glass, light bends or turns – known as refraction.
- We see through our eyes, which are organs that take in light and images and turn them into impulses that our brain can understand.
- We can see things because light either comes from an object—a light source—or is reflected by an object in straight lines. Shadows are formed when the light is blocked: these shadows can change as the light direction changes
- Light rays reflect (bounce) off objects and into our eyes, allowing us to see.
- Light is made of many different colours (white light), known as the spectrum.
- When light hits an object, some of the colours are absorbed by the object and some are reflected. The enables us to see objects in different colours.

Topic Vocabulary:

light wave, concave, convex, filters, lens, retina, cornea, iris, pupil, refraction, opaque, spectrum, transparent, translucent, photon, natural light, artificial light, opaque

Sequence:

- What is light energy?
- How does light travel? How does this help us see?
- How can refraction alter what we see?
- How do shadows change as light direction changes?
- What colour is light energy and how do we see colour?

Thinking Deeper:

Children can label parts of the eye and explain how each part is involved in seeing an object from which light energy is reflected.

Think about how mirrors are used to see from different angles (eg periscope/ hairdressers)

Books/Resources:

- Walkabout - James Vance Marshall
- The White Darkness - David Grann

Links:

- Subject Specific links – Maths – measuring lengths and distances
- Personal Development – To know not to look at the sun for health and safety
- SMSC – To know about others cultures which use light as part of a celebration: Diwali, Hanukkah etc.
- Cultural Capital – To be exposed to Chinese culture of shadow puppetry
- Careers – Electricians, opticians
- British Values – Working together in groups, valuing contributions to ideas to develop and investigation
- Equality – All children within the groups working together will have high expectations with regards to group investigation outcomes
- Independence – Independent working
- Outdoor learning – Forest School