Cantrell Primary School Science Curriculum

Year 6: Working Scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

6.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

6.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

6.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

6.4 using test results to make predictions to set up further comparative and fair tests

6.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

6.6 identifying scientific evidence that has been used to support or refute ideas or arguments.

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Year 6: Can you sort this mess? How are living things grouped together?

NC reference: Living things and their habitats

NC Objectives:

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics

Lesson Objectives:

Key Factual Learning:

- ✓ Animals have different physical features and abilities, such as number of legs, wings, ability to swim, whether they live on land etc, and they can be organised and sorted according to these features.
- ✓ Animals can be classified as mammals, birds, fish, reptiles, amphibians, insects, arachnids, annelids, molluscs, crustaceans and echinoderms.
- ✓ Carl Linnaeus was an 18th Century Swedish scientist who devised a way of classifying living things called the Linnaean System (subdividing each group into progressively smaller groups based on increasingly specific observations of features).
- ✓ The three main types of micro-organism are bacteria, virus and fungus.
- ✓ Mould grows best in damp and warm conditions.

Practical Tasks (Working Scientifically):

- Sort and group animals into 'tree diagrams' by asking questions about physical features and abilities. **6.3**
- Research Carl Linnaeus using iPads. **6.1**
- Classify animals by reading descriptions of characteristics of mammals, birds, fish, reptiles, amphibians, insects, arachnids, annelids, molluscs, crustaceans and echinoderms, and then matching animals to each description. **6.3**
- Research the three main types of micro-organisms using iPads and create information posters to present findings to others. **6.5**
- Investigate the conditions in which mould grows best by leaving slices of bread in plastic bags in different conditions (damp, wet, cold, dry, warm and dark) for two weeks. **6.1, 6.4**

Key Vocabulary:

characteristics, classification, Carl Linnaeus, taxonomists, identify, arachnids, annelids, molluscs, crustaceans and echinoderms micro-organisms, microscopic, bacteria, fungi, virus, mould

Cross-Curricular Links:

Art - Mina's sketchbook – observational drawings including specific physical features and characteristics of birds

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Year 6: Everything Changes! How has evolution led to me?

NC reference: Evolution and inheritance

NC Objectives:

- 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

Lesson Objectives:

Key Factual Learning:

- ✓ Over the course of the last century many fossils have been found that demonstrate the evolution of humans (homo sapiens). Initially, fossils were compared to the human skeleton to indicate the degree of similarity or difference. However, modern scientists have been able to map DNA in great detail and this gives them another way to compare how closely related we are to different living things in ways that could not have been detected by comparing skeletons alone.
- ✓ Living things produce offspring that are made up from DNA from each parent.
- ✓ Characteristics are inherited and acquired. Inherited characteristics are tongue rolling, hair colour, eye colour, cleft chin, dimples and freckles. Acquired characteristics could be playing an instrument, swimming, reading, drawing, singing, riding a bike.
- ✓ Adaptation - These are characteristics that are influenced by the environment the living thing lives in. Adaptation is the result of mutations which occur randomly. These can result in adaptive traits which confer the living thing with a function that enables it to survive better.
- ✓ Evolution is the process of adaptation over a long period of time. This process, whereby certain inherited and adaptive traits allowed them to live and reproduce while others became extinct, is called natural selection.
- ✓ Darwin believed that there was a single point of origin for all living things and that we then evolved into the living things that we are today through a process of adaptation. Darwin used fossils as evidence to support his theory of evolution.
- ✓ The theory of evolution is seen as the most comprehensive theory of how humans came to be on Earth.

Practical Tasks (Working Scientifically):

- Label pictures with sentences to explain fossilization. (Catch up lesson)
- Investigate inherited characteristics by looking at photos and questioning parents. **6.1**
- Sorting animals, habitats and how they have adapted to survive. **6.3**
- Research Charles Darwin using iPads. **6.1**
- Record sentences to show what the key ideas of evolution are.
- Compare different pictures to gather evidence of evolution. **6.6**

Key Vocabulary:

Inheritance, humans, parent, offspring, characteristics, variation, environment, habitat, DNA, genes, adaptive traits, mutation, replication, accidental, evolution, adaption, apes, mammals, homo sapiens, family, genus, species, taxonomy

Cross-Curricular Links:

Reading – Skellig (theme of evolution)
Geography – Our Changing World – how have our coasts, borders and local environments evolved and changed over time?
RSE – Physical changes during puberty
Whole class text: Darwin's Dragons

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Year 6: What can we learn from studying circuits?

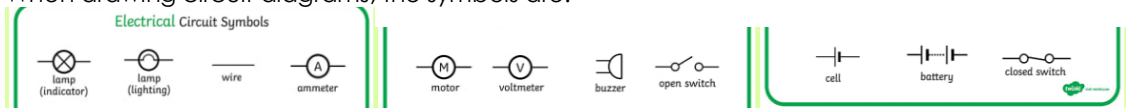
NC reference: Electricity

NC Objectives:

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- use recognised symbols when representing a simple circuit in a diagram

Lesson Objectives:

Key Factual Learning:

- ✓ Ancient Egyptians and Greeks were aware of some of the properties of electricity (such as electric shocks and static electricity) but did not know that electrical currents existed.
- ✓ William Gilbert studied and distinguished between magnetism of metals and static electricity.
- ✓ Alexandro Volta invented the first battery. His name was the basis for 'volt' and 'voltage'.
- ✓ Benjamin Franklin was the first person to study electricity in depth. He proved that lightening is electrical. He was also the first person to store electricity and know that it consisted of positive and negative charges.
- ✓ Thomas Edison reinvented the lightbulb.
- ✓ When drawing circuit diagrams, the symbols are:
- ✓ 

- ✓ Increasing the voltage in a circuit will increase the output (make a bulb shine brighter or a motor spin faster). Decreasing the voltage in a circuit will decrease the output.
- ✓ Switches can be used to create a break in a circuit and disable the output. Switches make or break a circuit, turning the component (for example, lamp) on when the switch is closed and off when the switch is open.
- ✓ The number of components in a circuit affects the way the circuit performs.

Practical Tasks (Working Scientifically):

- Research information about key discoveries in the history of electricity and create a timeline **6.1**
- Discuss and evaluate how different electrical inventions have impacted on our lives. **6.1, 6.5**
- Create simple circuits using wires, bulbs and batteries and draw and label them using the correct symbols. **6.1, 6.3**
- Investigate the effects on the bulb by changing the number of cells in a simple circuit. **6.5**
- Investigate what happens in a circuit when the switch is in different positions. **6.5**
- Create a simple switch using everyday materials.
- Investigate increasing the number of components in a circuit by constructing a circuit with a single 1.5 V cell, switch and buzzer, and then increasing the number of buzzers and recording what happens. **6.6**

Key Vocabulary:

Electricity, Thomas Edison, Nikola Tesla, Alessandro Volta, Michael Faraday, home, alternating current, direct current, battery, cell. Voltage, circuit, bulb, wires, cell, battery, buzzer, motor, switch, circuit diagram, brightness, loudness, increase, decrease, mains electricity, terminal, types of switches including toggle, push, slide, tilt, plunger, trembler, pressure

Cross-Curricular Links:

D&T – Travel game

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Year 6: Light Up Your World! How do we see?

NC reference: Light

NC Objectives:

- 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

Lesson Objectives:

Key Factual Learning:

- ✓ We see things because light travels from light sources to our eyes or from light sources to objects and then to our eye.
- ✓ Shadows are formed when an opaque object blocks a ray of light. A shadow is always the same shape as the object that casts it. This is because when an object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling.
- ✓ Mirrors reflect light.
- ✓ Reflection is when light bounces off a surface, changing the direction of a ray of light. All objects reflect light; smooth and shiny surface reflect all the rays of light at the same angle, rather than scattering the rays of light like rough or dull surfaces.
- ✓ The light ray that hits the mirror or other object is described as the incident ray, and the ray of light that bounces off is known as the reflected ray.
- ✓ Refraction changes the direction in which light travels. Light waves travel at a different speed when they go through other transparent materials, such as water or glass. This causes the rays of light to change direction and bend. This is known as refraction. When light travels from air through a transparent material, it refracts, or bends.
- ✓ Light travels from a light source, reflects off an object, goes through our pupil (which is a hole in our eyes), through to the lens, where the retina turns the light into electrical signals which travels to our optic nerve that sends messages to our brain that interprets the messages into what we see.
- ✓ In 1666, Newton made a discovery about light that led him to develop his Theory of Colour,
- ✓ A prism changes a ray of light to show the visible spectrum.
- ✓ Since each colour's wavelength is slightly different, the colours in the ray of light bend slightly differently. This causes them to separate and become visible to our eyes. Red bends the least, and violet bends the most.
- ✓

Practical Tasks (Working Scientifically):

- Identify which are light sources or reflectors of light. **6.1**
- Measure the angle of incidence and reflection using a protractor **6.2**
- Investigate refraction using an arrow and a glass of water. **6.1, 6.4, 6.5**
- Research Isaac Newton and what he discovered about light. **6.1**
- Understand how we see and how glasses and sunglasses work. Draw labelled diagrams. **6.3**
- Shine a torch through a prism to discover what white light is made up of, then make a colour wheel to investigate the visible spectrum. **6.5**
- Investigate how to make a rainbow to show the different colours of the visible spectrum. **6.5**

Key Vocabulary:

Light, source, travel, straight line, waves, ray, beam, wave, reflection, angle, incidence, normal, Refraction, bend, lens, focus, focal point, transparent, opaque, translucent, pupil, retina, optic nerve, cornea

Cross-Curricular Links:

Maths – Measuring using protractors

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Year 6: Body Pump! Why do we need to look after our heart?

NC reference: Animals, including humans

NC Objectives:

- identify and name the main parts of the human circulatory system, and 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 (Drugs is covered in DAaRT)
- describe the ways in which nutrients and water are transported within animals, including humans

Lesson Objectives:

Key Factual Learning:

- ✓ The heart pumps blood in the blood vessels around to the lungs. Oxygen goes into the blood and carbon dioxide is removed. The blood goes back to the heart and is then pumped around the body.
- ✓ Nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used, they produce carbon dioxide and other waste products.
- ✓ Carbon dioxide is carried by the blood back to the heart and then the cycle starts again as it is transported back to the lungs to be removed from the body. This is the human circulatory system.
- ✓ Diet, exercise, drugs and lifestyle have an impact on the way our bodies function. They can affect how well out heart and lungs work, how likely we are to suffer from conditions such as diabetes, how clearly, we think, and generally how fit and well we feel.
- ✓ Some conditions are caused by deficiencies in our diet e.g. lack of vitamins.
- ✓ Digestive system is made up of oesophagus, small intestine, large intestine and stomach.
- ✓ Nutrients are absorbed into the blood in the small intestine. There are tiny hair-like villi that help this process happen. The nutrients are carried in the blood to the different parts of the body that need them. Waste from the small intestine is passed through the cecum into the large intestine. Water is squeezed out of the colon back into the body. The dry waste is stored in the rectum. It is then pushed out of the body as faeces through the anus.

Practical Tasks (Working Scientifically):

- Show a video of a heart pumping blood to demonstrate what is happening inside their own bodies. **6.1, 6.2, 6.5** Draw the circulatory system, labelling the different parts accurately **6.5**
- Research using iPad and non-fiction books how the heart and lungs work. **6.5**
- Keep an exercise diary for a week – set questions for them to answer before/while and after exercising. **6.1, 6.2, 6.5, 6.6**
- What happens to the circulatory system during exercise? Work scientifically to understand the effect of exercise on their pulse rate. The children are to decide how/ what they will do and how they will record their results. **6.1, 6.2, 6.5, 6.6**
- Research how the digestive system works – explain how each organ works.
- Oak academy PowerPoint investigating what needs to be in our diet and why diets change depending on lifestyle. Why do people with different lifestyles need different diets. **6.5**
- Research the different purposes of nutrients. Look at nutrition deficiencies and how this affects our heart? Create a healthy meal which covers all the main nutrients for a meal. Why is this important for our heart?
- Can explain both the positive and negative effects of diet, exercise, drugs and lifestyle on the body

Key Vocabulary:

Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle

Cross-Curricular Links:

PE/Daily Mile – Feeling pulse rates, observing effects on own body