Cantrell Primary School Science Curriculum

Year 4: Working Scientifically

During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

4.1 asking relevant questions and using different types of scientific enquiries to answer them

4.2 setting up simple practical enquiries, comparative and fair tests

4.3 making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

4.4 gathering, recording, classifying and presenting data in a variety of ways to help in answering questions

4.5 recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

4.6 reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

4.7 using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions

4.8 identifying differences, similarities or changes related to simple scientific ideas and processes

4.9 using straightforward scientific evidence to answer questions or to support their findings.

Cantrell Primary School Science Curriculum

Year 4: How does electricity make things work?

NC reference: Electricity

NC Objectives:

- 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

Lesson Objectives:

- Be able to identify well known scientists who have contributed to the development of electricity around the world.
- Be able to identify common appliances that run on electricity
- Be able to identify the dangers of electricity in the home and begin to recognise that the dangers are often associated with materials that are good conductors.
- Be able to construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- Be able to 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

Key Factual Learning:

- ✓ Scientists that are famous for their work in developing electricity are Thomas Edison, Lewis Latimer and James Watt (also linked to Sound unit)
- ✓ Some appliances run on electricity and others on batteries
- ✓ All appliances and electrical toys require a power supply to work
- ✓ Cookers, torches, mobile telephones, kettles and televisions are all examples of electrical appliance and they use different sources of power.
- ✓ There are many dangers in the home linked to electricity.
- ✓ A circuit must be complete in order to work.
- ✓ A circuit must include a source of power and an output.
- ✓ A circuit can have a switch to control a light or a buzzer switching it on or off
- ✓ Materials can be either conductors or insulators.
- ✓ Electrical energy can be converted into other types of energy such as light, heat, movement or sound.

Practical Tasks (Working Scientifically):

- Recall information about scientists well-known for their work in developing electricity. Identify
- Name common appliances that run on electricity. Discuss the different types of electrical energy, such as light, heat, movement and sound. (Verbal partner work). **4.4, 4.6**
- Identify dangers in the home using a range of photographs of kitchens and living rooms. **4.9**
- Design and make safety posters to reinforce the dangers of electricity inside and outside of the home. **4.1, 4.6**
- Make electrical series circuits using the right equipment. **4.1-4.2, 4.4-4.6**
- Complete a working circuit with a switch. **4.1-4.2, 4.4-4.9**
- Recognise that plastic and wood are examples of materials that act as insulators. **4.8-4.9**
- Recognise that copper and water act as conductors - supported by YouTube clip. **4.8-4.9**
- Experiment with a variety of materials and sort which are conductors and which are insulators. **4.1- 4.9**
- Assessment and review

Key Vocabulary:

electricity, light, heat, movement, sound, dangerous, electrical appliances, battery/ies, circuits, complete series electrical circuit, battery, bulbs, switches, buzzers, cells, conductors, insulators

Cross-Curricular Links:

Art – safety poster
English – researching key questions linked to electricity.
D&T – make a simple electrical toy/light for someone with an on/off switch and a battery.

Cantrell Primary School Science Curriculum

Year 4: How do solids, liquids and gases differ?

NC reference: States of matter

Objectives:

- Describe the properties of solids, liquids and gases
- Understand the difference between the particles in solids, liquids and gases.
- *Compare and group materials together, according to whether they are solids, liquids or gases.*
- *Know and understand the difference between the particles in solids, liquids and gases by sorting.*
- *Observe, discuss and understand the properties of 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 Factual Learning:

- ✓ Matter is what makes up the physical aspects of our universe.
- ✓ All matter exists in one of just three states, solids, liquids or gas.
- ✓ There are spaces between particles of gas and liquids.
- ✓ There are no spaces between particles of solids.
- ✓ Gas matter can expand, flow and be squeezed.
- ✓ If gas is in an unsealed container then it can escape.
- ✓ States of matter can change from one to another.
- ✓ Solid matter holds its shape. For example, the solid form of water is ice.
- ✓ Solids can change to liquids and vice versa.
- ✓ Liquid matter, such as water, forms a pool. It can flow or run but cannot be stretched or squeezed.
- ✓ Liquids can change to gas and vice versa.
- ✓ Temperature rise and decrease can cause these changes.
- ✓ Steam is water's gaseous form.
- ✓ Liquids can change to gas and vice versa.
- ✓ These changes can happen all around us even in Nature, eg as seasons change.
- ✓ The Water Cycle shows how water is recycled into our seas and oceans and how rain is made.
- ✓ Evaporation is when water turns into water vapour. Water vapour is also known as steam.
- ✓ Condensation is the opposite of evaporation, it is when water vapour turns back into water/ water droplets.
- ✓ Precipitation is when enough water vapour has collected in the clouds and falls to the Earth as rain.
- ✓ Collection is when the rain collects on the Earth into our seas, rivers and streams.
- ✓ These changes can be found in your own home and in the world around
- ✓ Scientists – Marie Curie (1867 – 1934), Joseph Priestley (1733–1804), Sir William Ramsay, (born Oct. 2, 1852, Glasgow, Scot. —died July 23, 1916).

Practical Tasks (Working Scientifically):

- Identify three main elements of liquid, gas, solids **4.1, 4.8, 4.9**
- Sort the given materials into solids, liquids or gases. **4.3, 4.4**
- Draw a diagram to show the three states of matter, showing an understanding of how the particles behave in solids, liquids and gases. **4.1, 4.8, 4.9**
- Discuss choices and reasons for each one. **4.6**
- Discuss and explain how hard or easy it is to squeeze the air out of an empty bottle with the lid on/off. **4.6 4.9**
- Explain and demonstrate, in terms of particle behaviours, how a perfume (liquid) can travel as a gas around the room, by spraying some on a tissue then hiding it around the room and how gas particles behave. Explain how gases are used in the world today.
- Experiment and explain how ice cubes melt and change state from solid to liquid and why this would happen (link to temperature). **4.6 4.9**
- Explain what freezing and melting means and how the particles change in these processes. **4.6 4.9**
- Demonstrate explain how chocolate can change from a solid to a liquid state and why this happens (link to temperature). **4.4 4.6 4.9**
- Experiment how solids change to liquids by melting ice cubes over a bowl of warm water and observe the temperature of when melting starts.
- Discuss and explain how to reverse the procedure to go from a liquid state back into a solid state by freezing or lowering the temperature. **4.1-4.9**
- Discuss and explain how water is transferred and re-used through the Water Cycle. **4.6 4.9**
- Explain the terms Evaporation, Condensation, Precipitation and Collection in terms of the Water Cycle. **4.6 4.7**
- Explore which of these states of matter can be found in the real world and in our own homes. **4.1, 4.5**
- Evaluate and write up all conclusions into books. **4.5 4.6 4.7**
- Assessment and review

Key Vocabulary: solid, liquid, gas, evaporation, condensation, particles, temperature, freezing, heating, salt, particular theory, water molecules, prediction, overflowing, mass, weight, water, time, minutes, seconds, reservoir, stopwatch, measure, grams, kilograms, chromatography, substances, mixtures of substances, filter paper, separation, molecules move at a different rate, speed, time, speed, distance, analysis, travelled.

Cross-Curricular Links:

History - The Romans – How the Romans moved water
Maths – mass, time, measuring, temperature.
Geography – A detailed study of the water cycle is undertaken in year 4

Cantrell Primary School Science Curriculum

Year 4: How do we hear?

NC reference: Sound

Objectives:

- Identify how sounds are made, associating some of them with something vibrating
-Recognise that vibrations from sounds travel through a medium to the ear
-Understand the basic workings of the human ear.
-Find patterns between the pitch of a sound and features of the object that produced it
-Recognise that sounds get fainter as the distance from the sound source increases and as we get older.
-Describe the life and work of a famous scientist – Sir Alexander Graham Bell

Key Factual Learning:

- ✓ Sounds are made when an object vibrates.
- ✓ We hear sounds when the vibrations travel from a source through a medium to our ears.
- ✓ Sound travels through different mediums, including air, water and solids.
- ✓ The sound waves are gathered by the outer ear and sent down the ear canal to the eardrum.
- ✓ The sound waves cause the eardrum to vibrate, which sets the three tiny bones in the middle ear into motion.
- ✓ The motion of the bones causes the fluid in the inner ear or cochlea to move.
- ✓ The pitch is how high or low a sound is and this can vary
- ✓ Animals hear in different frequencies. eg. Dog, elephant, bat and dolphin.
- ✓ Sound produces vibrations that travel through another medium such as air or water to reach the ear.
- ✓ The louder the volume the stronger the vibrations.
- ✓ Sounds get fainter when you are further from the source of the sound.
- ✓ The louder the volume the more we can hear it.
- ✓ We live in a world of sound, but our ability to hear the world around us declines as we age.
- ✓ Famous scientists who are known for their work on sound are- Thomas Eddison, who invented the first phonograph and Alexander Graham Bell who invented the telephone.

Practical Tasks (Working Scientifically):

– Conduct a sound walk around school, or in the classroom to identify which sounds we can hear **4.4**
-Discuss how these sounds are made and say what is vibrating to create the sound we hear **4.9**
- Recognise that sound comes into the human ear from an outside source. **4.9**
-Explain that sound travels in waves called soundwaves. **4.9.**
- Watch 'Understanding how the human ear works' film on YouTube. **4.1, 4.7-4.9**
-Name the three small bones that are inside the human ear. **4.8.4.9**
-Name and explain other parts of the human ear. **4.8.4.9**
-Explain how sound travels from outside the human ear through it to the eardrum. **4.8.4.9**
-Use iPads and reference books to research the human ear and draw detailed diagrams to show how the human ear works. **4.7-4.9**
- Investigate differences in hearing low and high pitch/frequency sounds. **4.1-4.9**
-Explain how the frequency of a sound can affect how you hear it. **4.8.4.9**
-Discuss how getting older affects our hearing. **4.1**
-Discuss if this might be true for all animals not just humans.**4.1**
-Explore and discuss which animals can hear higher/ lower frequencies. **4.8.4.9**
- Investigate how sounds get fainter as the distance from the sound source increases. 4.7-4.9 (the recording room game) **4.1-4.9**
- Discuss famous scientists – Thomas Edison – he invented the first phonograph
- Alexander Graham Bell – the first telephone
– Assessment week

Key Vocabulary: Vibrate, vibration, vibrating, air, medium, ear, hear, sound, volume, pitch, faint, fainter, loud, louder, soft, softer, string, percussion, woodwind, loudness, frequency, sound waves, tone, speaker, delicate hearing mechanism, external acoustics, incus (anvil), malleus (hammer), semi-circular canals, nerves, cochlea, stapes (stirrup), auditory tube, pinna, protection, eardrum, wax, length, thickness and tautness, hertz

Cross-Curricular Links:
Music – Wider Opportunities Programme – Learning baritones, trumpets and cornets. Vocabulary to support this. There are major links to the Music curriculum particularly related to definition and understanding of vocabulary.

Cantrell Primary School Science Curriculum

Year 4: How can living things be classified?

NC Reference: Living things and their habitats

Objectives:

- recognise that living things can be grouped in a variety of ways (2 lessons)
- 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.
- Describe the life and work of the famous scientist Jane Goodall

Key Factual Learning:

- ✓ The 7 characteristics of a living things are movement, reproduction, sensitivity, nutrition, excretion, respiration, and growth.
- ✓ The environment may change both naturally and also due to human impact.
- ✓ Animals can be put in to groups such as fish, amphibians, reptiles, birds, and mammals; and invertebrates into snails and slugs, worms, spiders, and insects.
- ✓ The three distinct body regions of an insect are head, thorax, and abdomen.
- ✓ One reason scientists classify living things is to understand the relationships between different organisms.
- ✓ Scientists – David Attenborough/Jane Goodall (conservation and animal welfare), Libbie Hyman

Practical Tasks (Working Scientifically):

- Recap from Year 3 - List the 7 different characteristics for all living things
-Explain how each one helps something to live and grow **4.1 4.9**
-Understand the characteristics of a living thing and to begin to consider that living things can be grouped in a variety of ways. **4.8, 4.9**
- Use Venn and Carroll diagrams to group living things. **4.5**
- Explore and use classification/identification keys to help group, living things. **4.1– 4.9**
- Recognise that environments can change and that this can sometimes pose dangers to living things.
-Ask relevant questions about living things and their habitats. **4.9**
- Notice the tiny details that will help scientists to further classify living things and to record these details in a careful drawing of insects. **4.3-4.5**
- Make observational drawings and a large-scale group drawing of an insect. **4.3-4.5**
– Famous scientist Jane Goodall. Research and create a fact file.
– Assessment

Key Vocabulary:

Alive, dead, never been alive, movement, reproduction, sensitivity, nutrition, excretion, respiration, growth, habitat, local, living thing, plant, animal, insect, natural, man-made, observation, record, vertebrate, invertebrate, arachnid, question

Cross-Curricular Links:

Art - Create sketch books to record their observations and use them to review and revisit ideas. Improve their mastery of art and design techniques, including drawing

Cantrell Primary School Science Curriculum

Year 4: Where does my food go?

NC Reference: Animals, including humans

Objectives:

- describe the simple functions of the basic parts of the digestive system in humans
- label the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey.

Key Factual Learning:

- ✓ Food enters the body through the mouth. Digestion starts when the teeth start to break the food down.
- ✓ Saliva is added and the tongue rolls the food into a ball.
- ✓ The food is swallowed and passes down the oesophagus to the stomach.
- ✓ Here the food is broken down further by being churned around and other chemicals are added.
- ✓ The food passes into the small intestine.
- ✓ Here nutrients are removed from the food and leave the digestive system to be used elsewhere in the body.
- ✓ The rest of the food then passes into the large intestine. Here the water is removed for use elsewhere in the body.
- ✓ What is left is then stored in the rectum until it leaves the body through the anus when you go to the toilet.
- ✓ Humans have four types of teeth - incisors for cutting, canines for tearing, molars and premolars for grinding (chewing).
- ✓ Humans can also have wisdom teeth.
- ✓ These do not develop in some people.
- ✓ Different animals have different types of teeth based on their diet.
- ✓ A food chain is a way of explaining how different animals pass energy to each other.
- ✓ A food chain has to start with a source, usually the sun.
- ✓ A food chain often ends with a predator normally at the top of the chain.
- ✓ Living things can be classified as producers, predators and prey according to their place in the food chain.
- ✓ Food chains are essential for the survival of all species, plant or animal, including humans
- ✓ Food chains are not fixed, they can change for the better or worse by removing or introducing a species
- ✓ Famous Scientist: Hans Krebs (biochemist) – inventor of the Krebs cycle?

Practical Tasks (Working Scientifically):

–- Research the parts of the digestive system **4.1**
-Explain in simple terms the different parts of the digestive system **4.6**
-Compare the human digestive system with that of an animal eg a cow **4.6**
– Research the function of the different parts of the human digestive system
-Create a model of the digestive system **4.1-4.9**
-Label the parts of a human digestive system **4.4**
- Explain how the different type of teeth in a human mouth are used **4.6**
-Explain their functions in terms of food **4.6**
-Consider why our teeth are different shapes and understand that they have different functions.
- Discuss what they know about how to keep our teeth healthy. **4.3-4.5**
- Classify animals as herbivores, carnivores or omnivores according to the type of teeth they have in their skulls **4.9**
-Research information using the Internet (and/or information books). **4.1**,**4.8**,**4.9**
- Construct and interpret a variety of food chains, identifying producers, predators and prey. **4.4**
-Make links between plants and animals in the form of food chains. **4.1-4.9**
-Discuss with others the impact a break in the food chain may have. **4.1, 4.8, 4.9**
-Begin to understand that humans have a responsibility to care about their impact on food chains.
- Construct and interpret a variety of food chains, identifying producers, consumers, predators and prey. **4.4**
-Use secondary sources to identify animals in a habitat and find out what they eat. **4.4**
-Digestive System -Human Body for Kids-How Body Works- makemegenius.com.
-Assessment lesson

Key Vocabulary:

Question, digestive system, nutrition, mouth, teeth, saliva, oesophagus, stomach, small intestine, large intestine, rectum, anus, faeces, teeth, incisors, molars, canines, jaw, evidence, digestion, chew, saliva, herbivore, carnivore, omnivore, digestion, food chain, producer, predator, prey, consumer, herbivore, omnivore, carnivore, impact

Cross-Curricular Links:

PE - to be physically active for sustained periods of time
PSHE – Healthy lifestyle choices
DT – Design a healthy picnic lunch

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