Year 6 Science

<table>
<tr><th>By the end of Year 6 children will be able to…</th><th>NC PoS</th><th>Key Learning
&
Key Vocabulary</th></tr>
<tr><td>Living things and their habitats
● Describe the characteristics of amphibians, reptiles, birds, fish and mammals (recap Y4)
● Compare the characteristics of animals in different groups
● Talk about the two main groups of plants (flowering and non-flowering) and give examples of each
● Create classification keys for plants and animals and micro-organisms (partial recap Y4)
● Explain what micro-organisms are and how they help or hinder us
● Say what the 5 kingdoms of living things are
● Talk about the work of Carl Linnaeus and why his work was influential
● Use classification materials to identify unknown plants, animals and microbes
● Classify living things according to Linnaean principles (Kingdom, Phylum, Class, Order, Family, Genus, Species)
● Create an imaginary living thing (animal, plant or microbe) that has characteristics from more than one classification group and give its classification</td><td>● 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</td><td>Key learning
Living things can be formally grouped according to characteristics. Plants and animals are two main groups but there are other livings things that do not fit into these groups e.g. micro-organisms such as bacteria and yeast, and toadstools and mushrooms. Plants can make their own food whereas animals cannot.
Animals can be divided into two main groups – those that have backbones (vertebrates) and those that do not (invertebrates). Vertebrates can be divided into five small groups – fish, amphibians, reptiles, birds and mammals. Each group has common characteristics. Invertebrates can be divided into a number of groups including insects, spiders, snails and worms.
Plants can be divided broadly into two main groups – flowering plants and non-flowering plants.

Key vocabulary:
Vertebrates, fish, amphibians, reptiles, birds, mammals, invertebrates, insects, spiders, snails, worms, flowering and non-flowering</td></tr>
<tr><td colspan="3">Scientific enquiries for living things & their habitats
● Carl Linnaeus was a scientific pioneer. Why? (research)
● Can you create a key to classify plants, animals and micro-organisms? (identifying and classifying)</td></tr>
<tr><td colspan="3">Key experiences
● Use a variety of keys
● Look at different plants, animals and microbes in books to extend their knowledge (DK animal book/DK trees, leaves, flowers and seeds book)</td></tr>
<tr><td>Animals including humans
• Explain how the heart works and its different parts and their functions
• To explain the process of blood circulation around the body
• Locate the different parts of the circulatory system
• Describe the functions of blood and blood vessels
• Explain the impact of exercise on heart rate
• Explain the impact of different things on their bodies such as drugs, alcohol, smoking, diet and exercise</td><td>• 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
• describe the ways in which nutrients and water are transported within animals, including humans</td><td>Key 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.
Key vocabulary
Heart, pulse, rate, pumps, blood, blood vessels, arteries, veins, capillaries, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs and lifestyle</td></tr>
<tr><td colspan="3">Scientific enquiries for animals including humans
● How do you train like an Arctic explorer? (research)
● The further I run, the higher my heart rate? True or false? (pattern seeking)
● What does your resting heart rate and recovery rate tell us about how fit you are? (pattern seeking)
● How can I ensure my heart lasts a lifetime? (research)</td></tr>
<tr><td colspan="3">Key experiences
● Create a role play model for the circulatory system with the children
● To look at the Human Body Interactive Simulation to explore the Circulatory System (Stem)
● Watch video with Brian Cox and sport scientist about heart rates of athletes
● Personal Trainer to speak to children about exercise, diet, health and fitness
● Physiotherapist to speak to children about working in ICU and recovery from heart attacks
● To watch simulated video conference for the developer of ‘Fruity Munchy Square’ to discuss whether new snack bar should be banned. Licensed or endorsed.

Suggested Outcomes
● To create an information text on the human circulatory system including the different components of blood
● To create an explanation text showing how blood is pumped around the body
● Analyse and interpret data about heart rate
● To carry out a survey to find the worst side effect of smoking</td></tr>
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- To calculate how much alcohol is in different alcoholic drinks
- To look at different people's profiles and suggest ways in which they can improve their lifestyle
- To carry out a survey to find out the most popular forms of exercise in school and how they can be promoted
- To compare sugar levels in different types of food

Evolution and inheritance ● Explain the process of evolution by natural selection ● Explain how Darwin developed the theory of natural selection ● Explain and identify features that individuals have inherited from their parents ● Explain how some animals are adapted to their environment ● To explain how adaptation is important to the survival of species ● To explain some of the strategies animals adopt to survive winter and adaptations exhibited by animals in polar regions ● Explain how some plants are adapted to their environments ● Explain what fossils are and how they were formed ● Explain the job of a palaeontologist	● 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	**Key learning** All living things have offspring of the same kind, as features in the offspring are inherited from the parents. Due to sexual reproduction, the offspring are not identical to their parents and vary from each other. Plants and animals have characteristics that make them suited (adapted) to their environment. If the environment changes rapidly some variations of a species may not suit the new environment and will die. If the environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. Over time these inherited characteristics become more dominant within the population. Over a very long period of time these characteristics may be so different to how they were originally that a new species is created. This is evolution. Fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. More recently scientists such as Darwin and Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics. **Key vocabulary** Offspring, sexual reproduction, vary, characteristics, suited, adapted, environment, inherited, species, fossils
Scientific enquiries for evolution & inheritance ● What influences the most, nature or nurture? (observing and comparing) ● Who was Charles Darwin and why was he important? (research) ● How do animals and humans keep warm in the Arctic? (observing and comparing; research) ● The longer your beak, the easier it is to pick up your food? True or false? Prove it (pattern seeking STEM)		
Key experiences ● Evolution Megalab – Professor Steve Jones looks at genetic diversity (STEM) ● Snail Space – Interpret data on different snails ● Create Fossil Jelly to demonstrate fossilisation **Suggested Outcomes** ● News report on the history of life on Earth (Stem) ● Design own species adapted to a particular habitat		
Light • Explain how the shape and size of a shadow are determined • Explain how moving an object changes the size of its shadow • Explain how we see light sources and non-light sources • Explain how a periscope works • Explain that light travels in a straight line • Label the main parts of a human eye and explain their functions • Explain my knowledge of reflection to place mirrors to make light follow a path • Explain how white light is made up of a spectrum of different colours	• 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	**Key learning** Light appears to travel in straight lines and we see objects when light from them goes into our eyes. The light may come directly from light sources but for other objects some light must be reflected from the object into our eyes for the object to be seen. Objects that block light (are not fully transparent) will cause shadows. Because light travels in straight lines the shape of the shadow will be the same as the outline shape of the object. **Key vocabulary:** As for year 3 plus straight lines, light rays.
Scientific enquiries for light ● Light travels in straight lines. True or false? Prove it (pattern seeking) ● How many different colours can white light be split in to? (research)		
Key experiences ● Create a shadow puppet show using own bodies (YouTube – 'Attraction' Theatre Group) ● Working in groups build their own model to demonstrate how light travels ● Construct their own periscope ● Make a rainbow in class ● To create a spinner to demonstrate that a range of colours can be combined into white light		
Electricity *<u>Carousel of activities</u> to recap previous learning as follows:* • *Revises the key concept that a complete circuit is needed to light a bulb or make a motor spin.* • *Reminds children how to change the brightness of a bulb or the speed of a motor. This can be achieved by adding/removing cells or by changing the voltage of the battery*	• 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	**Key learning** Adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. Adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. Turning a switch off (open) breaks a circuit so the circuit is not complete

• *the effects of 'overloading' a circuit with too many bulbs or motors. The power from the cell or battery is shared between them* • *Tackle the challenge of creating a circuit using a switch they have made themselves* • *Complete the Blobz guide to electricity http://www.andythelwell.com/blobz/.* • Explain the concept of static electricity • Know that atoms have equal numbers of electrons and protons • Explain that electrons have a negative charge and protons have a positive charge • Explain where electricity comes from and different ways in which electricity can be generated • Identify and name the basic parts of a simple electric circuit (cells, wires, bulbs, switches, batteries) • Explain the difference between a series and a parallel circuit • Draw and construct working circuits • Recognise symbols for various common circuit components • Describe the function of electrical components and match them to their symbols • Explain the effect of changing the number and voltage of cells in an electrical circuit • Explain how the brightness of a bulb can be altered by changing the wires and or circuit • Explain why an electrical appliance might blow if the voltage is too high		and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. You can use recognised circuit symbols to draw simple circuit diagrams. **Key Vocabulary** Circuit, complete circuit, circuit diagram, circuit symbol, cell, battery, bulb, buzzer, motor, switch, voltage NB Children do not need to understand what voltage is but will use volts and voltage to describe different batteries. The words cells and batteries are now used interchangeably
Scientific enquiries for electricity ● Where does electricity come from and how many ways can it be created? (research) ● What effects the brightness of a bulb? (comparative and fair testing) ● How could we use tissue paper to find out how bright the bulb is? (pattern seeking)		
Key experiences ● Using balloons to illustrate negative charge and static electricity – separating salt and pepper ● Role play is used to demonstrate current flow and how a light bulb is energised through a closed circuit ● Match and draw circuits and symbols according to given instructions ● Create circuits according to given diagrams ● Research the life and work of a famous scientist linked to electricity (Michael Faraday, Nicola Tesla, Alessandro Guiseppe Antonio Anastasio Volta, Thomas Edison, James Swan and James Watt)		
● Observe, describe and compare in careful detail ● Sort and classify with precise reasons ● Make predictions and explain why ● Plan how to collect evidence/information/data to test out an idea/prediction or answer a question ● Measure precisely in standard units ● Select the most suitable equipment for the task ● Plan ways to test out their own/someone else's ideas ● Set up and carry out fair tests ● Repeat observations and measurements ● Draw tables, bar charts and simple line graphs to record observations/data ● Interpret and predict from bar charts and line graphs ● Explain observations/results using cause and effects and scientific facts and ideas ● Explain what the evidence show and whether it supports any predictions ● Identify trends and patterns in data and explain using scientific facts and ideas ● Begin to identify scientific evidence that has been used to support or refute ideas or arguments ● Select the most appropriate way to communicate findings, evaluating the evidence as well as describing it ● Talk about how to improve their own work giving reasons	● asking relevant questions and using different types of scientific enquiries to answer them ● setting up simple practical enquiries, comparative and fair tests ● making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers ● gathering, recording, classifying and presenting data in a variety of ways to help in answering questions ● recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables ● reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ● using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions ● identifying differences, similarities or changes related to simple scientific ideas and processes ● using straightforward scientific evidence to answer questions or to support their findings.	