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|  | **Topic** | **National Curriculum Outcomes***(Endpoints children will achieve)* | **Substantive Knowledge** *(specific facts, e.g. herbivores feed on plants linked to: Living things and habitats; Animals including humans, Plants, materials, Rocks, Forces and magnets, evolution and inheritance, electricity, light, Earth and space.* | **Disciplinary Knowledge***(Know how to … be able to… know that…because….)**Working scientifically* | **Concepts***(discovery, change, investigation, cause and consequence)* | **Vocabulary**  | **Culture***(What is wonderful and awesome in Science? How do children feel successful and show/ promote this? What enrichment?)*  |
|  |  |  | Children will know how to/be able to: | Children will know how to/be able to: | Children will appreciate: | Children will recall and verbalise: |  |
|  | **Living Things and Their Habitats** | 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 animalsgive reasons for classifying plants and animals based on specific characteristics.**WORKING SCIENTIFICALLY*** **Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments**.
 | **Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria and single-celled organisms Living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do.****Know that a classification key uses questions to sort and identify different living things****Know that there are three types of micro-organism and know what they are.** | * **Know how to choose appropriate variables to test a hypothesis**
* **Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary**
* **Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)**
 |  | Classification, Vertebrates, Invertebrates, Micro-organisms, Amphibians, Reptiles, Mammals, Insects Know and use the terms micro-organism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs**Revision****prediction,** **measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis**New learning and vocabulary**relationship, outlier** | Class pet (Axolotyl) study and classification.  |
| **Light**  | 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.**WORKING SCIENTIFICALLY*** **Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**
* **Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision**
* **Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs**
* **Sc5/1.4 using test results to make predictions to set up further comparative and fair tests**
* **Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations**
 | **Know that light travels in straight lines** to explain that objects are seen because they give out or reflect light into the eye**Know that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.****Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection.****Know that shadows have the same shape as the objects that cast them because light travels in straight lines.** **Know that when light passes from one medium to another it changes direction and this is called refraction.** | * K**now how to choose appropriate variables to test a hypothesis**
* **Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device**
* **Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement**
* **Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion**
* **Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary**
* **Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)**
 | * **Know how to identify conditions that were imperfectly controlled and can explain how these might affect results**
 | Refraction, Reflection, Light, Spectrum, Rainbow, Colour,**WORKING SCIENTIFICALLY****Revision****prediction,** **measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis**New learning and vocabulary**Line graph****relationship outlier** | Making a periscope.  |
| **Electricity**  | Sc6/4.2a associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuitSc6/4.2b 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 switchesSc6/4.2c use recognised symbols when representing a simple circuit in a diagram.**WORKING SCIENTIFICALLY*** **Sc5/1.1 planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary**
* **Sc5/1.2 taking measurements, using a range of scientific equipment, with increasing accuracy and precision**
* **Sc5/1.3 recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs**
* **Sc5/1.4 using test results to make predictions to set up further comparative and fair tests**
* **Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations**
 | **Know that batteries are a store of energy. This energy pushes electricity round the circuit. When the battery’s energy is gone it stops pushing. Voltage measures the ‘push.’** **Know that the greater the current flowing through a device the harder it works.** **Know that current is how much electricity is flowing round a circuit.** **Know that when current flows through wires heat is released. The greater the current, the more heat is released.****Know the symbols used in a simple circuit diagram.** | * **Know how to choose appropriate variables to test a hypothesis**
* **Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement**
* **Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion**
* **Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary**
* **Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)**
 | * Know how to identify conditions that were imperfectly controlled and can explain how these might affect results
 | Cells, Wires, Bulbs, Switches, Buzzers, Battery, Circuit, Series, Conductors, Insulators, Amps, Volts, Cell**WORKING SCIENTIFICALLY****Revision****prediction,** **measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis**New learning and vocabulary**relationship, outlier** | Making a light up Christmas card in DT. |
| **Evolution and Inheritance**  | Sc6/2.3a recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years agoSc6/2.3b recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parentsSc6/2.3c identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.* Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.
 | **Know that all life on Earth began** **from a single point around 4.5** **billion years ago****Know that living things change over** **time and that this gradual change is** **called evolution****Know that Charles Darwin posited** **this theory of evolution by natural** **selection** | **Know that the gradual change of** **species over millions of years can** **be observed by looking at examples** **of fossil****Know that variation exists within a population (and between offspring of some plants)*** Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary
* Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)
 | * Know how to identify conditions that were imperfectly controlled and can explain how these might affect results
 | Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics**Revision****prediction,** **measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis**New learning and vocabulary**relationship** |  |
| **Animals Including Humans**  | identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and bloodrecognise the impact of diet, exercise, drugs and lifestyle on the way their bodies functiondescribe the ways in which nutrients and water are transported within animals, including humans**WORKING SCIENTIFICALLY*** **Sc5/1.5 reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations**
* **Sc5/1.6 identifying scientific evidence that has been used to support or refute ideas or arguments.**
 | **Know the main parts of the human circulatory system****Know the functions of the heart, blood vessels and blood.****Know the ways in which nutrients and water are transported within animals, including humans** | **Be able to explain the impact of diet, exercise, drugs and lifestyle on the way their bodies function.*** **Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary**
* **Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)**
 | * Know how to identify conditions that were imperfectly controlled and can explain how these might affect results
 | Circulatory, Heart, Blood Vessels, Veins, Arteries, Oxygenated, Deoxygenated, Valve, Exercise, Respiration**WORKING SCIENTIFICALLY****Revision****prediction,** **measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis**New learning and vocabulary**Line graph****relationship outlier** |  |