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| Science | **Pedagogical Knowledge**  **Science pedagogy is based in the development of conceptual understanding, processes, skills of enquiry and developing scientific attitudes.**  There are many ways to elicit children’s ideas including:   * Drawing * Writing * Responding to a stimulus * Concept mapping * Individual or group discussions   **Best Practice Specific Pedagogies for Science**   * Analogues and illustrations to help children visualise abstract concepts. * Demonstrations to bring concepts to life. * Models to represent ideas such as the structure of a flower. * Animated models to support understanding of dynamic systems. * New ideas need to be related to children’s experiences, for example talking about puddles when teaching about evaporation. | | | | |
| Y1&2  Cycle A | **Autumn**  **Childhood** | | **Spring**  **Bright Lights, Big City** | **Summer**  **School Days** | |
| Unit | Everyday Materials | Human Senses | Seasonal Changes | Plant Parts | Animal Parts |
| Local Heritage |  |  |  |  |  |
| Y1 | **Know that objects are made from different materials.**  **Know that some objects are human made; others are natural.**  **Describe the properties of everyday materials.**  Test the properties of materials.  Compare and group materials.  Record results in a Venn diagram. | **Identify, name and label parts of the human body.**  **Know which part of the body is associated with each sense.**  With support, record information on a Venn diagram. | **Know there are four seasons: Spring, Summer, Autumn and Winter.**  **Know that some trees lose their leaves during Autumn.**    **Know day length is the number of daylight hours.**  **Know that people must stay safe in the sun.**  Observe how day length changes.  Gather and record data to help answer questions about different seasons.  Investigate weather using toys, models or simple equipment. | **Identify and name a variety of common wild and garden plants.**  **Identify and describe the parts of plants(root, stem, leaf, flower, petal, fruit)**  **Know that plants grow from seeds or bulbs.**  Use observations and ideas to suggest answers to questions. | **Know that different animal groups have some similar body parts.**  **Know there are different groups of animals.**  **Know that living things need warmth, food, water, and shelter.**  **Know animals can be grouped according to their diet (carnivores, herbivores and omnivores)**  Label and describe the basic structures of fish, amphibians, reptiles, birds and mammals.  Group and sort animals based upon what they eat. |
|  | Greater Depth | | | | |
|  | Explain what happens to certain materials when they are heated or cooled. | Name some parts of the human body that cannot be seen. | Observe features in the environment and explain that these are related to a specific season.  Observe and talk about changes in the weather. | Begin to describe what each part of a plant does (e.g. roots, stem, leaves, petals, pollen) on a range of plants. | Say why certain animals have certain characteristics.  Begin to classify animals according to a number of given criteria. |
| Y2 | **Know a variety of different everyday materials and name them.**  **Identify human made and natural materials.**  **Know that materials with different properties have different uses.**  Compare and group materials in a variety of ways.  Gather and sort simple data in a range of ways. | **Name the basic body parts of the human body explain their uses.**  **Know how senses keep people safe.**  Label a diagram of the human body.  Sort animals based upon their features.  Record similarities and differences in Venn diagrams. | **Know that some trees are evergreen; others are deciduous.**  **Describe typical UK seasonal weather patterns.**  **Know that day length is longer in the summer months and shorter in the winter months in the UK.**  **Know and explain how to stay safe in the sun.**  **Know that wind strength is measured by the Beaufort scale**.  Observe and describe how day length changes across the year.  Ask questions then use simple equipment to measure weather. | **Name the parts of a plant and their function.**  **Know what a plant needs to survive.**  Observe and record the growth of a plant. | **Name the processes that define living things.**  **Name the 6 animal groups( mammal, amphibian, bird, reptile, fish, reptiles)**  **Know that carnivores eat other animals; herbivores eat plants; and omnivores eat animals and plants.**  Use Carroll diagrams to classify animals.  Ask scientific questions and answer them using research, observation or simple tests. |
|  | Greater Depth | | | | |
|  | Describe the properties of different materials using words like, transparent or opaque, flexible. | Describe what animals need to survive and link this to their habitats. | Talk about weather variation in different parts of the world. | Describe what plants need to survive and link it to where they are found. | Name some characteristics of an animal that help it to live in a particular habitat. |
| Y3&4  Cycle A | **Autumn**  **Through The Ages** | | **Spring**  **Rocks, Relics and Rumbles** | **Summer**  **Emperors and Empires** | |
| Unit | Skeletal & Muscular Systems | | Forces and Magnets | Light & Shadows | Plant Nutrition & Reproduction |
| Local Heritage | Centre for Life, Newcastle | | John Walker - Friction Match |  |  |
| Y3 | **Know that animals need the right type and amount of nutrition.**  **Know that animals get nutrition from what they eat.**   * **Identify that humans and some animals have skeletons and muscles for support, protection and movement.** * **Know what vertebrates and invertebrates are.**   With support, set up and carry out some simple, comparative, and fair tests, making predictions for what might happen. | | **Know rocks are organised into three groups: metamorphic, igneous and sedimentary.**  **Compare and group rocks based on their appearance, properties or uses.**  **Describe simply how fossils are formed, using pictures or a model.**  **Describe different types of soil based upon their properties.**  Investigate soils from the local environment, making comparisons and identifying features.  **Know that objects move differently on different surfaces.**  **Know that some forces need contact between two objects.**  **Know that magnetic forces can act at a distance.**  Use straightforward scientific evidence to answer question or to support their findings.  Compare how objects move over different surfaces. | **Know that light can be reflected from different surfaces.**  **Know that shadows are formed when the light from a light source is blocked by a solid object.**  Investigate how shadows change during the day.  **Know that there are transparent, translucent and opaque materials.** | **Identify the different parts of flowering plants.**  **Know what plants need to grow.**  **Know that a plant has a life cycle.**  **Know the process of pollination.**  Investigate the way in which water is transported within plants.  Draw and label the life cycle of a plant. |
|  | Greater Depth | | | | |
|  | Explain how the muscular and skeletal systems work together to create movement. | | Investigate the strengths of different magnets and find fair ways to compare them. | Explain what happens to the electricity when more batteries are added. | Classify a range of common plants according to many criteria (environment found, size, climate required etc). |
| Y4 | **Identify components of a balanced diet.**  **Know the three main types of muscle are skeletal, cardiac and smooth.**  **Identify and label major bones of the human skeleton.**  **Identify and name three types of joints.**  **Describe the advantages and disadvantages of exoskeletons and endoskeletons.**  Plan and carry out an investigation to answer a question of their choice. | | **Know how metamorphic, igneous and sedimentary rocks are formed.**  **Identify, compare and group rocks based on their appearance, properties or uses.**  **Describe how fossils are formed.**  **Identify different types of soil based upon their properties.**  Investigate soils from the local environment, making comparisons and identifying features.  **Explain how magnets attract or repel each other and attract some materials and not others.**  **Explain what friction is and why different objects move differently on different surfaces.**  Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials.  Take measurements using force meters. | **Know the difference between reflective and non- reflective materials.**  **Know how shadows are formed.**  **Know why shadows change size.**  Identify transparent, translucent and opaque materials.  Find patterns in the way that the size of shadows change**.** | **Explain how the structure of a leaf enables it to support the plant through transpiration photosynthesis.**  **Explain the stages in the life cycle of a plant.**  **Explain different types of pollination (wind, animals, explosion and water).**  Investigate how water is transported in plants.  Gather, record, classify and present data in a variety of ways to help in answering questions.  Draw and label the life cycle of a plant. Explain each stage. |
|  | Greater Depth | | | | |
|  | Classify living things and non-living things by a number of characteristics that they have thought of. | | Begin to relate the properties of rocks with their uses. | Explain why their shadow changes when the light source is moved closer or further from the object. | Give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment. |
| Y5&6  Cycle A | **Autumn**  **Dynamic Dynasties** | | **Spring**  **Sow Grow and Farm** | **Summer**  **Groundbreaking Greeks** | |
| Unit | Forces & Mechanisms | Earth & Space | Human Reproduction & Ageing  *(Plants- taught through Sow, Grow, Farm)* | Properties and Changes of Materials | |
| Local Heritage | George Stephenson | Wynyard Planetarium & Observatory |  | ICI – Perspex  John Dorman, Dorman Long | |
| Y5 | **Identify different contact and non-contact forces.**  **Know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.**  Plan different types of scientific enquires to answer questions including, recognising and controlling variable where necessary. | **Know that day and night are caused by the rotation of Earth around the sun.**  **Identify the different phases of the moon.**  Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.  Describe the movement of the Moon relative to the Earth. | **Know population changes in a habitat can have significant consequences for food chains and webs.**  ***Compare the life cycles of animals, including a mammal, an amphibian, an insect and a bird.***  ***Describe the life process of reproduction in some plants and animals.***  *Group and sort plants by how they reproduce.*  ***Identify the parts of a flower involved in sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal).***  **Describe the stages of mammalian life cycles.**  **Describe the changes as humans develop to old age.**  Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. | **Know materials have different properties including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.**  **Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.**  **Know there are reversible and irreversible changes.**  Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. | |
|  | Greater Depth | | | | |
|  | Describe and explain how motion is affected by forces. | Compare the time of day at different places on the earth. | Draw a timeline to indicate stages in the growth and development of humans. | Describe methods for separating mixtures. (filtration, distillation) | |
| Y6 | **Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.**  **Explain the effects of air resistance, water resistance and friction that act between moving surfaces.**  **Explain how some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.**  Plan different types of scientific enquires to answer questions including, recognising and controlling variable where necessary. | **Explain how day and night and the seasons occur due Earth’s orbit of the sun.**  **Explain how the different phases of the moon occur.**  **Know why gravity causes planets to be spherical.** | *Describe, using their knowledge of food chains and webs, what could happen if a habitat had a living thing removed or introduced.*  Describe the difference between asexual and sexual reproduction.  *Explain the process of sexual reproduction in plants (stamen, filament, anther, pollen, carpel, stigma, style, ovary, ovule and sepal).*  **Know that human growth charts are line graphs that show the projected growth for juveniles.**  Report and present findings from enquiries, including conclusions, causal relationships and explanations. | **Demonstrate that dissolving, mixing and changes of state are reversible changes.**  **Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.**  **Explain the process of reversible and irreversible changes giving examples.** | |
|  | Greater Depth | | | | |
|  | Work out how water can cause resistance to floating objects. | Explore the work of some scientists (Ptolemy, Alhazen, Copernicus) | Compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, e.g. rainforests. | Explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar with bicarbonate of soda. | |