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| **Science Curriculum Milestone 3** | | | | | | |
| **Knowledge organisers and fluent in five checks:** | | | | | | |
| **Useful websites to use:**  <http://www.jbprimaryscience.co.uk/home>  <https://www.ogdentrust.com/resources-cpd/resources>  <https://www.reachoutcpd.com>  <https://www.ase.org.uk/resources>  <https://www.stem.org.uk/resources> | | | | | | |
| **Science Enquiry Skills** | | | | | | |
| **Enquiry Planning** | | | **Scientific Enquiry** | **Enquiry Recording** | | **Enquiry Evaluation** |
| • Plan enquiries, including recognising and controlling variables where necessary. | | | • Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.  • Take measurements, using a range of scientific equipment, with increasing accuracy and precision.  • Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models. | • Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions. | | • Present findings in written form, displays and other presentations.  • Use test results to make predictions to set up further comparative and fair tests.  • Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments. |
| **Aspect** | **Key Vocabulary** | **Sticky Facts** | | | **Essential Knowledge** | |
| **Biology:**  Life Cycles  **Endangered** | Puberty  Gestation  Classification  Reproduction  Teenager  Toddler  Obese  Embryo  Life cycle  Pollination  Fertilisation  Germination  Metamorphosis | * See SRE policy for reproduction in animals (Yr6). * See SRE policy for changes in puberty (Yr5). * Many insects have four stages in their life cycle: egg; larva; pupa; adult stage. * The life cycles of plants and animals have three basic stages: fertilized egg or seed, immature juvenile, and adult. * Pollen is carried by insects or blown by the wind from one flower to another. **This process** is called pollination. * Pollen reaches the new flower and travels to the ovary where it fertilises egg cells (ovules) to make seeds. * All seeds need water, oxygen, and proper temperature in order to germinate. | | | * Know the life cycle of different living things, e.g. mammal, amphibian, insect bird * Know the differences between different life cycles * Know the process of reproduction in plants * Know the process of reproduction in animals * Create a timeline to indicate stages of growth in humans | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils should draw a timeline to indicate stages in the growth and development of humans. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.  **(NC Non- Statutory):** Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. They might try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. | | | | | | |
| **Biology:**  Circulatory systems  **Olympics**  **Year 5 only** | Blood Vessels  Atrium  Ventricles  Cardio-vascular  Capillaries  Pulse  Artery  Veins  William Harvey | * Blood is what is used to transport oxygen, waste, nutrients, and more throughout the body. * The circulatory system includes the heart, blood vessels and blood. * The heart is made up of 2 upper chamber (atrium) and 2 lower chambers (ventricles). * The heart is a pump and pumps up to 2000 gallons of blood every day. * Blood vessels move blood to and from the heart. * Because your heart is crucial to your survival, it’s important to keep it healthy with a well-balanced diet and exercise, and avoid things that can damage it, like smoking. | | | * Identify and name the main parts of the human circulatory system * Know the function of the heart, blood vessels and blood * Know the impact of diet, exercise, drugs and life style on health * Know the ways in which nutrients and water are transported in animals, including humans | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health. | | | | | | |
| **Biology:**  Animal Classification  **Endangered** | Micro-organism  Vertebrates  Invertebrates  Species  Fungi  Bacteria  Cold blooded  Molluscs  Exoskeleton  Crustacean  Carl Linnaeus | * An invertebrate is an animal that does not have a backbone. * Vertebrate animals can be either warm or cold-blooded. A cold-blooded animal cannot maintain a constant body temperature. * Mammals and birds are warm blooded. * A vertebrate animal is one that has a backbone. * There are several different invertebrate groups such as insects / arachnids / molluscs / crustaceans. * Living organisms can be classified on their different characteristics. | | | * Classify living things into broad groups according to observable characteristics and based on similarities and differences * Know how living things have been classified * Give reasons for classifying plants and animals in a specific way. | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system. | | | | | | |
| **Biology:**  Evolution  **Endangered** | Offspring  Adaptation  Evolution  Inheritance  Genes  Chromosomes  Genotype  Charles Darwin | * **Evolution** is the theory that all the kinds of living things that exist today developed from earlier species. * **Adaptation** is the process by which animals, plants and other living things have changed so that they better suit their habitat. * **Genes** from parents that **are** passed on to **you** determine many of your traits, such as your hair colour and skin colour. * We know that living things have changed over time, because we can see their remains in the rocks / fossils. | | | * Know how the Earth and living things have changed over time * Know how fossils can be used to find out about the past * Know about reproduction and offspring (recognising that offspring normally vary and are not identical to their parents) * Know how animals and plants are adapted to suit their environment * Link adaptation over time to evolution * Know about evolution and can explain what it is | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.  Investigate which items are more difficult to pick up with tweezers. | | | | | | |
| **Chemistry**  Reversible and irreversible changes  **Olympics Year 6 only**  **(2020: Child of our time).** | Solubility  Transparency  Thermal  Evaporation  Dissolve  Filtering  Melting  Freezing  Separate  Solution  Insoluble  Condensing | * Irreversible changes – such as burning - can’t be undone as a new product is made * Reversible changes such as melting and freezing are a change in state and **can** be reversed. * Where a solid is soluble, it will dissolve in a liquid and form a solution. * A solid which is insoluble in a liquid can be separate by filtering. * A solid that has dissolved in a liquid can be separated by evaporation and condensing. | | | * Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets * Know how a material dissolves to form a solution; explaining the process of dissolving * Know and show how to recover a substance from a solution * Know and demonstrate how some materials can be separated (e.g. through filtering, sieving and evaporating) * Know and can demonstrate that some changes are reversible and some are not * Know how some changes result in the formation of a new material and that this is usually irreversible | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: carrying out tests to answer questions, for example, ‘Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?’ They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials. | | | | | | |
| **Physics:**  Electricity  **Let me entertain you** | Conductor  Insulator  Series Circuit  Cell  Generator  Fuse  Current  Voltage  symbol  Thomas Edison | * The brightness of the bulb is affected by the amount of voltage given by the cell. * A series circuit is one that has more than one resistor (bulb or buzzer etc), but only one path through which the electricity flows. * The brightness of bulb or volume of a buzzer is less when more components are added or the length of wire is longer as they give greater resistance. * Electricity circuit symbols | | | * Compare and give reasons for why components work and do not work in a circuit * Draw circuit diagrams using correct symbols * Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit. | | | | | | |
| **Physics:**  Light  **Out of this world** | Light Wave  Light Source  Concave  Convex  Filters  Lens  Retina  Cornea  Iris  Pupil | * Light travels in a straight line. * We see things when light travels from a light source, to an object and then into our eyes. * The iris controls the pupil and controls the amount of light that comes into the eye. * The retina is at the back of your eye and it has light-sensitive cells called rods and cones. * A lens is curved glass designed to refract light: concave curves light inwards and convex curves light outwards. * The **size of a shadow** depends on the distance between the light source and the object that blocks that light source: the closer they are the bigger the shadow. | | | * Know how light travels * Know and demonstrate how we see objects * Know why shadows have the same shape as the object that casts them * Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).   * Observing over time: How does my shadow change over the day? Moon diary (homework). * How does the length of daylight hours change with each season? * How can I see around a corner – create a periscope. * How can light be reflected around the room only using mirrors. | | | | | | |
| **Physics:**  Forces  **Vikings** | **Friction**  **Gravity**  **Air resistance**  **Water resistance**  **Levers**  **Pulleys**  **Gears**  **Parachute**  **Isaac Newton** | * All types of forces are either a push or a pull. * Frictional force is when 2 surface rub against one another, causing it to slow down. * Air resistance is a type of friction when a material moves through the air; it affects how quickly or slowly it moves. * Water resistance is a type of friction when a material moves through the water. * Gravity is the pulling force acting between the Earth and a falling object; gravity pulls objects to the ground. * Levers, pulleys and gears allow a smaller force to have a greater effect. | | | * Explain how levers, pulleys and gears allow a smaller force to have a greater effect * Identify and know the effect of friction * Identify and know the effect of air and water resistance | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.   * Look at the weight of different objects on different planets – links to gravity. * Patern seeking: weighing things in and out of water. | | | | | | |
| **Physics:**  Earth and Space  **Out of this world** | Orbit  Solar System  Planet  Rotation  Spherical  Crescent moon  Eclipse  Luna  Jocelyn Bell Burnell  Sara Seager | * Gravity is the pulling force acting between the Earth and a falling object; gravity pulls objects to the ground. * An orbit is a repeating path that one celestial body (planet) takes around another. * The sun is a star at the centre of our solar system. * Our solar system includes 8 planets, all orbiting the sun. * The moon is a celestial object that orbits the Earth; its position of this orbit determines how much is lit up by the sun (full moon / half-moon / eclipse) * The Earth takes 24 hours to spin on its own axis. As the Earth spins to face away from the Sun it is night and when it is facing the Sun it is daylight. * The Earth is tilted on its axis, causing the sun to “appear” to move up and down throughout the day. * It takes the Earth 365 days to orbit the sun (1 year). | | | * Know what gravity is and its impact on our lives * Describe the Sun, Earth and Moon (using the term spherical). * Know and demonstrate how night and day are created * Know about and explain the movement of the Moon relative to the Earth * Know about and explain the movement of the Earth and other planets relative to the Sun | |
| **Enquiry Ideas:**  **(NC Non- Statutory):** Pupils might work scientifically by: comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks.   * Ogden Trust: Planetary picnic – Tub of pringles in space. * Research: Does the size of the planets affect how long it takes to orbit the sun? Which planets might humans be able to live on? What will happen to the earth as the sun dies? What unusual objects did Jocelyn Bell Burnell discover? How have our ideas of our solar system over time change? * Pattern seeking: is there a pattern to the size of a planet and the time taken to travel around the sun? * Identify and classify: Can we make a key to identify planets? | | | | | | |