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| **Science Curriculum Milestone 2** |
| **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** |
| • Ask relevant questions. • Set up simple, practical enquiries and comparative and fair tests | • Gather, record, classify and present data in a variety of ways to help in answering questions.• Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers. | • Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables. • Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. | • Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests. • Identify differences, similarities or changes related to simple, scientific ideas and processes. • Use straightforward, scientific evidence to answer questions or to support their findings. |
| **Aspect**  | **Key Vocabulary** | **Sticky Facts** | **Essential Knowledge**  |
| **Biology:**Eating: The Digestive System and Teeth**Streetwise** | **Intestines****Oesophagus** **Pancreas****Salivary Gland** **Enzymes****Molar****Incisor** **Canine**  | * The oesophagus takes food from the mouth down into the stomach so that digestion can begin.
* The stomach is filled with powerful acids that break down the food into smaller pieces.
* The liver creates different enzymes to help process food nutrients in the small intestine
* The main job for the small intestine is to absorb nutrients and minerals from food.
* The outside of teeth are covered with enamel and the inside have blood vessels and nerves.
* The front teeth are called incisors (snip), the four sharp teeth are called canines (tearing), the teeth at the back are called molars (for grinding).
 | * Identify and name the parts of the human digestive system
* Know the functions of the organs in the human digestive system
* Identify and know the different types of teeth that humans have
* Know the functions of different human teeth
* Compare the teeth of carnivore and herbivore.
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.* Identify and classifying: How to organise teeth into groups? How can we group the foods we eat? How can you make a chart to show what different animals eat?
* Give children different foods: how do they eat them? What teeth were used?
* Pattern seeking: is there a pattern between diet and shape of teeth? Do animals with the same types of mouths eat the same food?
* Research: how do dentists fix broken teeth?
* Dentists – contact to come in?
* Explore different toothpastes.
* BBC Teach: The amazing human body.
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| **Biology:**Food chains, Classification and the Environment**Explorers**  | **Food chain****Environment** **Predator****Prey****Vertebrate****Invertebrate****Mammal** **Amphibian** **Reptile****Producer****Consumer** | * A food chain is a diagram that shows us how animals are linked by what they eat.
* Predators hunt, or prey on, other animals and need their flesh to survive. Prey are captured and eaten by a predator.
* Plants can be grouped into flowering and non-flowering plants.
* A vertebrate is an animal with a skeleton and backbone.
* An invertebrate is an animal with no backbone: some have soft bodies; others have an exoskeleton.
 | * Know how changes to an environment could endanger living things
* Use classification keys to group, identify and name living things
* Use and construct food chains to identify producers, predators and prey.
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: using and making simple guides or keys to explore and identify local plants and animals; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched. |
| **Biology:** Skeletons, Muscles and Nutrition **Streetwise** | NutritionCarbohydrateProteinDiet Skeleton Joint Pelvis Cartilage Rib cage TendonSpine | * The longest bone in the human body is the thigh bone called the femur.
* The human skeleton is made of bone and grows as we grow. The skull protects our brain and our ribs protect our heart and lungs.
* Muscles are attached to bones by tendons and help them to move. When a muscle contracts it gets shorter and pulls on the bone it is attached to.
* Joints allow the body to make movements.
* Spine known as the backbone. It is a strong, flexible and protects the spinal chord.
 | * Know that humans cannot make their own food. They get their nutrition from what they eat.
* That humans have skeletons and muscles for support, protection and movement.
* Know the names of the body parts associated with skeleton and muscles.
* Compare the diets of different groups of animals, including humans.
* Know about the importance of a nutritious, balanced diet and know what a healthy meal looks like
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons. They might compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. They might research different food groups and how they keep us healthy and design meals based on what they find out. * Pattern seeking: do male humans have larger skulls than female humans?
* Research: what types of vitamins keep us healthy and which foods do we find them in?
* BBC traffic scientific: Feet
* Identify and classifying: How do the skeletons of different animals compare? Eg, human and a fish.
* STEM: Bone bingo
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| **Biology:**Parts of a Plant **Explorers**  | Root Stem NutrientsPollination Seed dispersal Fertiliser StigmaAntherTranspiration Carpel | * To grow, plants need air, light, water, nutrients from soil, and room to grow.
* Trees absorb carbon dioxide and produce breathable air.
* Pollination is the act of transferring pollen grains from the male anther of a flower to the female stigma.
* Seed dispersal is the movement or transport of seeds away from the parent plant.
* The root is below the soil and absorbs water.
* Water travels through the plant up the stem and transpires out of the leaves.
 | * Know the function and names of different parts of flowing plants and trees
* Know how water is transported within plants
* Know the plant life cycle, especially the importance of flowers
* Explore the requirements of plants for life and growth: air, light, water, nutrients from soil and room to grow.
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed. They might observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.  |
| **Chemistry**States of Matter**Gods and Mortals**  | Water vapourCondensation Precipitation EvaporationSubstance MatterSolid LiquidGas  | * Water can exist in three forms: liquid (water), solid (ice) or gas (water vapour).
* About 70% Earth is covered in water.
* Water Cycle: The sun heats the water; water evaporates into the air as vapour; cools and turns back into water as clouds; droplets become heavy a drop as rain; rain then collects into the sea.
* When a liquid is heated, it evaporates and turns into a gas.
* When water vapour (gas) cools this is called condensation.
 | * Group materials based on their state of matter (solid, liquid, gas
* Know about and explore how some materials can change state
* Know the temperature at which materials change state
* Know the part played by evaporation and condensation in the water cycle
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: grouping and classifying a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). They could research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. They might observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.  |
| **Chemistry:** Rocks and Soils**It started in a cave** | FossilSoilCrystalsSedimentary Metamorphic Igneous Organic matterOrganism  | * Soils is made from rocks and organic matter.
* Fossils are formed having been trapped under layers of sedimentary rock.
* Extreme pressure and heat over time forms metamorphic rocks. Examples are marble and slate.
* When magma cools and solidifies it forms igneous rock. Examples are granite and pumice.
* Sedimentary rocks are made when sand, mud and pebbles get laid down in layers
 | * Compare and group rocks based on their appearance and physical properties, giving a reason
* Know how soil is made and fossils formed
* Know about and explain the difference between sedimentary, metamorphic and igneous rock
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. Pupils might research and discuss the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. Pupils could explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. They can raise and answer questions about the way soils are formed. |
| **Physics**Magnets **Romans** | Magnetic Magnetic PoleAttract RepelForce | * Magnets have 2 poles (north and south) and opposites attract; same poles repel.
* The Earth is a very big magnet. Its North and South poles are highly magnetic.
* A magnetic field is the area around the magnet where it can attract or repel things.
* Magnets only attract certain types of metals, other materials such as glass, plastic and wood aren't attracted.
 | * Know about and explain how objects attract and repel in relation to objects and other magnets.
* Predict whether magnets will attract or repel and give a reason.
* Describe magnets as having two poles.
* Predict whether two magnets will attract or repel each other, depending on which poles are facing.
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: comparing how different things move and grouping them; raising questions and carrying out tests to find out how far things move on different surfaces and gathering and recording data to find answers their questions; exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.  |
| **Physics**Light and Dark**It started in a cave** | Reflection ShadowLight sourceOpaque Translucent Transparent | * Our main source of light on Earth comes from the Sun. A ray of light travels very fast.
* A shadow is formed when an opaque object blocks the light.
* The sun is a source of light; the moon **is not** as it just reflects light.
* Some objects like glass are transparent which means that light can shine through them.
 | * Recognise that they need light in order to see things and that dark is the absence of light.
* Know that light is needed in order to see and is reflected from a surface
* Know and demonstrate how a shadow is formed and explain how a shadow changes shape
* Know about the danger of direct sunlight and describe how to keep protected
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes. * Comparative and fair test: Does the distance from the light source, change the size of the shadow? Which type of material is best for a secret den window or something similar?
* Black box – put an object inside ( no light, no see).
* Make shadow puppets
* What objects does light reflect off?
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| **Physics**Sound**Castles**  | Vibrating Pitch VolumeInsulation CochleaFrequency HammerOuter / Middle / Inner earAuditory  | * Sound is caused by the vibration of a medium (usually air) and it travels in waves.
* Our ears vibrate in a similar way to the original source of the vibration, allowing us to hear many different sounds.
* The higher the intensity of a sound, the louder it is perceived in our ears, and the higher volume it has.
* A tight drum skin gives a higher pitched sound than a loose drum skin.
 | * Know how sound is made associating some of them with vibrating
* Know how sound travels from a source, through a medium to our ears
* Know the correlation between pitch and the object producing a sound
* Know the correlation between the volume of a sound and the strength of the vibrations that produced it
* Know what happens to a sound as it travels away from its source
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands of different thicknesses. They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume. * Which type of cup makes the best cup telephone?
* Which material absorbs sound the best – noise cancelling headphones.
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| **Physics** Electricity **Romans**  | Battery Electrical CurrentCellsSwitchBuzzersConductorsSocket Appliance Series circuitInsulator  | * An electrical circuit is a path or line through which an electrical current flows.
* A conductor will allow the flow of an electrical current (metals) and know silver, copper and gold are best.
* An electrical cell (battery) is a device that is used to generate electricity
* An insulator is a material which will not allow a current to flow freely.
* A switch is an electrical can "make" or "break" an electrical circuit.
 | * Identify and name appliances that require electricity to function
* Construct a series circuit
* Identify and name the components in a series circuit (including cells, wires, bulbs, switches and buzzers)
* Predict and test whether a lamp will light within a circuit
* Know the function of a switch in a circuit
* Know the difference between a conductor and an insulator; giving examples of each
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| **Enquiry Ideas:** **(NC Non- Statutory):** Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.  |