Science Medium Term Plan – Key Stage 2

Class 2 Year A (Year 3 and 4)

Term and Cornerstone's topic	Term 1 Mighty Metals (Sc)	Term 2 Empires and Emperors (his)	Term 3 Burps, Bottoms & Bile (sc)	Term 4 Through the Ages	Term 5 & Term 6 Rocks, Relics & Rumbles
NC Programme of Study and Link	Forces and magnets (Yr3)		Animals inc. Humans (Teeth; Digestion (Yr4)		Rocks Yr 3 Sound Yr 4: Electricity Yr 4

Working scientifically

The following will be applied throughout Science topics. 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**

Vocabulary								
	air resistance **alloy aluminium** **attract** **beam** **bronze** **carbon** **common** **conductor** **contact force** **copper** **core** **damage** **direction** **Earth** **effort** **electricity** **extract force**	**force meter** **friction** **fulcrum furnace** **gold** **gravitational pull gravity** **heat** **iron** **lead** **lever** **load** **magnet** **magnetic field magnetism** **mass** **material**	absorb acid adult teeth bacteria balanced diet bile bite blood body bolus brush cancer canine carbohydrate cavity chew churn constipation crown	decay deciduous dentine dentist diabetes digestion digestive system dissolve enamel energy enzyme exercise faeces fat fibre fluoride food germs gums health	heart disease hygiene illness incisor jawbone large intestine lifestyle microorganism milk teeth mineral molar mouth muscle neck nutrient obesity oesophagus overweight plaque premolar	protein pulp rectum root roughage saliva small intestine stomach stomach ache stroke sugar teeth toilet tongue toothbrush toothpaste virus vitamin waste	absorb anvil blowing bow brass cochlea communicate country decibel (dB) ear ear canal eardrum electrical signal hammer hearing	circuit conductor current electricity insulator metal

							improvisation instrument insulator jazz keys mouthpiece note opera ossicles outer ear pinna pitch plucking pop project rhythm singing sound soundproof sound wave stirrup string theme tune valve vibration vibrato	
Week 1 or 7	**Experiment lesson- Playground visit** **Visit a local playground with a wide range of play apparatus. Allow the children time to explore, thinking about how the**	**Attract or Repel** **Test a range of magnets to investigate which poles attract and which repel. Use floating magnets to find out which pole points in which**	**Dental visit** **Visit a local dental surgery to meet the staff and talk to them about their work. (Or watch a video) Look at a range of model and real teeth and listen to the experts talking about different dental**		**Digestive organs** **Work in groups to handle and explore some of the organs of an animal's digestive system, including tongue, oesophagus, stomach (tripe) and small and large**		**Comparing Rocks** **Children explore, sort and classify different types of rock and investigate their properties. Encourage them to take on the role of assistant geologists,**	**What conducts electricity?** **Synopsis** **Children make a circuit using different materials to test how well they conduct an electric current.**

	equipment works. For example, what makes the swing move to and fro? Do all things slide down the slide at the same speed? What prevents you from being flung off the roundabout? Take digital images of the different play equipment in use, trying to capture the swinging, spinning or whooshing motions. *Knowledge: An object will not move unless a pushing or pulling force is applied. Some forces require direct contact, whereas other forces can act at a distance, such as magnetic force.*	direction. Specify the direction in which the magnet's north pole points. Using what they know about polar attraction, explain what this tells them about the Earth's magnetic poles. Predict whether two magnets will attract or repel each other, depending on which poles are facing. *Knowledge: Magnets have two poles (north and south). Opposite poles (north and south) attract each other, while like poles (north and north, or south and south) repel each other.*	procedures. Having prepared questions in class, encourage the children to ask their questions and make simple jottings and notes to remember any important facts and information. Describe what damages teeth and how to look after them. Vocabulary: molar, incisor, canine, milk teeth, decay, floss, enamel, filling, gum, root, plaque, dentine, pulp and wisdom tooth. Knowledge: Regular teeth brushing, limiting sugary foods and visiting the dentist are important for good oral hygiene.	intestine. Then use the web and other non-fiction resources to determine the function of each digestive organ. K: know the names and function of organs and basic parts of the digestive system Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. Use results to draw simple conclusions.	taking photographs of rocks and writing captions and labels to make an informative rocks display. An observation involves looking closely at objects, materials and living things, which can be compared and grouped according to their features.	Investigation Children use different components to make a series circuit that contains a buzzer or lamp. They then disconnect one of the wires and bridge the gap in the circuit with different materials to systematically test how well they conduct an electric current. Once they have tested a range of materials, children record which are conductors and which are insulators. They then build a working circuit of their own, including a lamp or buzzer, using conductive everyday items and materials instead of wires. Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic

						parts, including cells, wires, bulbs, switches and buzzers
Week 2 or 8	Sorting and classifying Annotate a picture of playground apparatus with words that describe the forces (push, pull, gravity, friction) needed to make the apparatus work. Sort and classify the apparatus into those that need a contact force and those that rely upon a non-contact force. Consider why a roundabout slows down when it is no longer pushed and whether they would continue to slide if a slide was horizontal. K: Friction is a force between two surfaces as they move over each other. Friction slows down a moving object. Smooth surfaces usually generate less friction than rough surfaces.	Attract or Repel Part 2 Investigate and compare a range of magnets (bar, horseshoe and floating) and explain that magnets have two poles (north and south) and that opposite poles attract each other, while like poles repel each other.	Effective teeth brushing Investigate how effectively they brush their teeth. Bring in their toothbrushes and, after brushing, chew a plaque disclosing tablet and check how much coloured plaque remains. Brush their teeth again to remove the remaining plaque. Suggest how a partner could improve their brushing. K: Regular teeth brushing, limiting sugary foods and visiting the dentist are important for good oral hygiene	Digestive system Make a flowchart/model to show each stage of human digestion. Be sure to get the stages in the right order – we don't want a blockage to occur! Describe the purpose of the digestive system, its main parts and each of their functions.	How are Rocks used? (Geography link) Investigate different rocks and properties. Remind the children of the appearance and properties of the rocks they looked at previously and explain that their different properties mean they are suitable for different uses. Show them the Uses of rocks presentation and discuss examples of properties that define a rock's use. Instruct the children to use what they have learned to complete the Uses of rocks recording sheet.	What conducts electricity? Synopsis: Children use conductive and insulating dough to create circuits and invent their own switches. Investigation Children learn how to make and use conductive dough to make a simple and successful circuit that lights an LED. They then introduce insulating dough to prevent short circuits. Exploring the different types of dough, children create simple models that light up, make noises or have a moving part. They then design and make a switch that turns their circuit on and off using the conductive dough or other resources.

						K: Play dough conducts electricity and we can use it to make fun circuits. Switches open and close a complete loop in a circuit, turning it on or off.
Week 3 or 9	Enquiry-Friction- Slip and slide - Investigate whether different materials affect how fast an object can slide down a slide. Think about why the surface of a slide is smooth and shiny. Discover which materials make for a faster or slower slide and consider why. Measure how fast the same object, wrapped in different materials, travels down a slide. Remember to use a slippery surface of the same incline to ensure a fair test.	Experiment – Cleaning Pennies Investigate what happens to tarnished pennies when soaked in water, vinegar, coke, ketchup and lemon juice. Notice what happens to the pennies when they are removed from the liquids. Find out if rinsing the pennies in water after soaking changes the final effect. Explain why the pennies change in appearance. Set up and carry out some simple, comparative and fair tests, making predictions for what might happen.	Investigating tooth decay- Investigate the effects of different drinks on a tooth-like substance. Place individual eggs or eggshells into beakers containing a range of different liquids, including fruit juice, full sugar and sugar free fizzy drinks, milk, water and coffee or tea. Observe what happens over the course of the week, comparing the eggs from the different liquids and recording their findings in a photographic diary. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.	Animals Business Read *The Story of the Little Mole who knew it was None of his Business* by Werner Holzwarth. Talk about the characteristics of the different animals' poo and then match pictures of animal poo to a picture card of an animal. Construct a classification key for the identification of an animal by its poo. Use simple 'yes' and 'no' questions, such as 'Is it brown? Does it contain fur? Is it wet or dry?' Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Fossils Show the children the How are fossils made? video on BBC Bitesize. After watching the video, ask them to recall and describe each step of fossil formation. Direct the children to complete the How fossils are formed recording sheet, using sentences to explain each step. At the end of the session, play the video again for them to check their explanations and make sure they've explained each step in the correct order. Describe in simple terms how fossils are formed when things that have lived are trapped within rock.	Sound: Volumes and Vibrations Investigate the volume of a range of sounds, measuring the decibels with a sound meter. Record decibel levels of each sound and plot on a graph, table or chart. Try measuring the sounds made by traffic from a nearby road, a pneumatic drill, a vacuum cleaner, a watch ticking, children shouting, leaves rustling and the school dinner hall. Create visible vibrations using different techniques: a drum skin on which rice grains are scattered; an elastic band plucked over an empty tub; the tip of

			Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further question. Use straightforward scientific evidence to answer questions or to support their findings.		Describe simply how fossils are formed, using words, pictures or a models.	a vibrating tuning fork placed in water; a ruler clamped to a table and tapped at one end. Talk about the sounds made using imaginative vocabulary. Describe what is creating the sound and what happens as the vibrations occur. Identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it

Week 4 or 10	Magnetic object hunt. Work in teams to find and list 20 different magnetic objects from around the school. Work out what each listed item is made from and identify its properties. Present their findings in simple tables or charts. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group materials based on their magnetic properties.	Magnificent Metals Use their carts to conduct a fair test, investigating the distance the carts travel when released down a slope. Decide what variables they will be testing, such as the length or angle of the ramp or the material that the ramp is made from. Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	Types of teeth Use models and real examples of teeth to find out about the four main teeth types – incisors, canines, premolars and molars. Annotate diagrams of the four types, using labels and captions to describe the characteristic shape, size, parts and function of each one. Draw a cross-section of a tooth to show its different parts, including pulp, enamel, blood vessels, nerve and dentine. **Knowledge:** There are four different types of teeth: incisors, canines, premolars and molars. Incisors are used for cutting. Canines are used for tearing. Premolars and molars are used for grinding and chewing. Carnivores, herbivores and omnivores have characteristic types of teeth. Herbivores have many large molars for grinding plant material. Carnivores have large canines for killing their prey and tearing meat.	How many stomachs does a cow have? In groups, research and compare the digestive system of a human with that of either a cow, rabbit, lion, chicken, owl, snake, horse, fly, snail or koala. Notice key similarities and differences in size and the number of main organs. Report their discoveries to the class, giving reasons for the differences, particularly those relating to diet.	Soil Testing Show the children the Soil presentation to learn more about the constituents and importance of soil and the three basic types. Explain that they are going to discover what type of soil is in the school grounds. Display the Soil investigation and talk through the steps before going outside to collect their samples and complete the investigation. Ensure the children wash their hands thoroughly after handling the soil. Back in the classroom, ask the children to record and display their results for what type of soil they identified in the school grounds. Discuss any discrepancies in their results and explain that there are regional variations in soil type, including	Sound Use models, diagrams and animations to find out and understand how the human ear works. Draw diagrams to explain how the different parts work, labelling them correctly with scientific terms, such as eardrum (tympanic membrane), ear canal, pinna, cochlea, outer ear and ossicles. Talk about how sound (vibrations) travels through different parts of the ear. When an instrument is played, the air around or inside it vibrates. These vibrations travel as a sound wave. Sound waves travel through a medium, such as air or water, to the ear.

					within the same locality. K: soils are made from rocks and organic matter.	
Week 5 or 11	Investigating Magnets Investigate the strength of different magnets using force meters. Record their results and calculate each magnet's average force. Some materials have magnetic properties. Magnetic materials are attracted to magnets. All magnetic materials are metals but not all metals are magnetic. Iron is a magnetic metal.	Quiz Time Work in mixed teams to take part in a forces quiz. Answer questions about a range of aspects covered during the project. Generate questions to ask children in other teams.	Science of spit Investigate how saliva starts the process of digestion. Chew a piece of cracker or banana, ensuring that the food is totally coated in saliva. Spit the food out onto a small paper plate. Now mash a similar sized piece of the same food with water to form a pulp, placing this on a second plate. Leave the samples overnight. Compare the samples in the morning and notice if they look (or smell) different.	Assessment Head start topic tests.	Assessment Head start topic test.	Exploring Pitch Listen to a range of different sounds and define whether each is high or low. Compare the pitch of sounds, describing them as higher or lower than others. Use elastic bands of different lengths and thicknesses to explore pitch, explaining the relationship between the length, thickness and tightness of the band to the pitch of the sound it generates. Note: Explain their findings using comparative sentences, such as 'the longer the band,

						the lower the pitch' or 'the thinner the band the higher the pitch'.
Week 6 or 12	Magnets -North and South Identify and label the north and south poles of a magnet. Explore and observe magnetic fields by placing bar, horseshoe and other magnets on or under a sealed container of iron filings or ferrofluid. Describe and compare the patterns formed by the various magnets. Equipment is used to take measurements in standard units. Examples include data loggers plus sensors, timers (seconds, minutes and hours), thermometers (°C) and metre sticks (millimetres, centimetres and metres). Taking repeat readings can increase the accuracy of the measurement.	Assessment Head start topic test.	Chop Tear and Grind Think carefully about how different teeth help them to eat. Examine a range of foods and test to see which teeth are best suited for chopping, tearing and grinding. Record their results in a table and compare results. Identify the four different types of teeth in humans and other animals, and describe their functions.	Terms 3 and 4 can often be 5 weeks, so this is kept free to help ensure time for full coverage.	This term can often be 5 weeks, so this is kept free to help ensure full coverage.	Assessment Head start end of year progress test.

Year B Class 2 (Year 3 and 4)

Term and Cornerstone's Topic	Term 1 & 2 Invaders & 1066	Term 3 Misty Mountains & Winding Rivers	Term 4 Blue Abyss	Term 5 & 6 Predator
NC Programme of Study	Light	States Of Matter	Living Things and their habitats	Animals including humans Plants
Working Scientifically: During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content: 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.				
Working Scientifically Focus	• asking relevant questions and using different types of scientific enquiries to answer them • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • 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	• Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • Gather, record, classify and present data in a variety of	Gather, record, classify and present data in a variety of ways to help in answering questions. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.	making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

	• identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.		ways to help answer questions. • Ask relevant questions and use different types of scientific enquiries to answer them. • Set up simple practical enquiries and comparative and fair tests. • Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.			
Term and Cornerstone's Topic	**Term 1 & 2** **Invaders & 1066**		**Term 3** **Misty Mountains & Winding Rivers**	**Term 4** **Blue Abyss**	**Term 5 & 6** **Predator /Plants**	
Vocabulary						**Key vocabulary** **carpel** **fertilisation** **flower** **pollen** **pollination** **seed** **sepal** **stamen**

Week 1	**Light Facts** **Introduce the children to the topic by sharing the Light presentation. Discuss the key learning in the presentation and the meaning of any unfamiliar vocabulary. Ask the children to answer the questions on the Light question sheet to assess their initial understanding of the topic. Use the Light answer sheet as you discuss the children's answers and address any errors or misconceptions.** **K: Recognise that light is needed to see things and that dark is the absence of light.**	**Class Survey** **Carry out a class survey of life today, in the style of the Domesday Book. Ask questions, such as 'Where do you live? What animals do you keep? What hobbies do you have? What types of music do you listen to? How do you travel to school?' Display their data in a range of graphing methods, including tables, pictograms and bar charts. Children to present data.** **Gather class data and present** **Can be moved to fit with the start of the 1066 section of the topic**	**Solids, liquids and Gases and Classifying solids, liquids and gases.** **Show the Solids, liquids and gases presentation to introduce the topic. After sharing, discuss the key learning points. Give the children the Solids, liquids and gases picture cards and ask them to sort the cards into the appropriate groups, including those they don't know. Check how children have sorted their cards and highlight any errors or misconceptions. Finally, ask the children to record their groupings on the Solids, liquids and gases table.** **Part 2** **Organise the children into groups and give each group some labelled examples to hold, observe and manipulate, including those difficult to classify previously. Ask the children to revisit their completed Solids, liquids and gases**	**Aquarium Visit** Visit an aquarium to gain a unique insight into the world of the deep. Observe aquatic life, finding out about the different species that live in the depths of the world's seas and oceans. Watch and draw different creatures in a sketchbook. Record information in notebooks or on tablets, paying special attention to the variation within and across species. Listen to experts talk about different animals, asking questions to help them learn more. Back in the classroom, encourage the children to use information and photos gathered during their visit to recount. Work in pairs or groups to discuss and make a bulleted list or mind map of things seen and discovered. Share observations and information with classmates, comparing the recordings made by different groups or	**Predator experience** Organise an animal experience, so that children can observe a range of predatory birds, insects, reptiles, amphibians and other animals. Invite an animal expert or ranger to run a hands on workshop, talking about each of the animals and encouraging the children to observe how they move and feed. Ideally, the children will be able to handle the animals and feel their form, weight, fur, scales or feathers. Remind the children to listen carefully to the expert's explanations and information and to ask plenty of relevant questions.	**What are flowers for?** **Learn the stages in the life cycle of a flowering plant. Watch short videos, animations or time-lapse clips that show the different stages of a flowering plant's life cycle. Look at pictures of the different stages of a dandelion's life cycle. Arrange the pictures chronologically and add labels. How important is the flower for a plant's life cycle?** **identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers**

			table from the previous session and add any new materials to the appropriate groups. Select some of the materials and ask, 'In which state is this material?' and 'How do you know?' Encourage children to use the correct vocabulary and the characteristic properties in their explanations. They could also record their explanations in their science books. Highlight some materials that children may not have been able to assign to a group, such as gels or foams. Use the Unusual materials presentation to introduce the concept that some materials have properties of more than one state. K: Materials can be grouped according to whether they are solids, liquids or gases. Solids stay in one place and can be held. Some solids can be squashed, bent, twisted and stretched. Liquids move around (flow) easily and are difficult	pairs. Work together as a class to compile a list of research questions for project work.		

			to hold. Liquids take the shape of the container in which they are held. Gases spread out to fill the available space and cannot be held. Air is a mixture of gases. WS: Compare and group materials together, according to whether they are solids, liquids or gases.			
Week 2	Identify and Classify Recap the difference between light sources and reflectors using the Light sources and reflectors presentation. Demonstrate the difference by putting a small number of light sources or reflectors, one at a time, in a sealed cardboard box with a small hole in the side. Light sources light up the inside of the box when viewed through the hole, and reflectors do not. Ask the children to have small group	Opaque, Transparent and Translucent Ask, 'Do all objects create shadows?' and encourage children to give you their initial thoughts. Ask, 'Do all objects create shadows?' and encourage children to give you their initial thoughts. Provide children with torches and a range of transparent, translucent and opaque objects or sheet materials. Direct them to explore making shadows with the equipment. Give them	Particle Theory Ask 'Why do solids, liquids and gases have different properties?' Gather the children's initial thoughts. Explain that particles make up all materials, and it is how these particles are arranged that defines a material's state. Share the Particle theory video to help the children understand the three states and their properties. Use the Modelling particle theory teacher information to demonstrate why solids, liquids and gases have the	**Sorting and grouping** **Sort a wide range of images of living things seen at the aquarium into groups. Continue to sort the images repeatedly, using a different grouping strategy each time. Group digital images onto a presentation slide, adding a title for each group and labelling individual creatures.** **K: Scientists classify living things according to shared**	Predator terminology Recap (KS1) or learn the terms carnivore, herbivore, omnivore, producer, consumer (primary, secondary and tertiary), apex predator and decomposer. Sort images of a wide range of living organisms into these groups, deciding on the best way to present their data. List physical features of each group and see if there are any similarities between them. Discuss any challenges faced	**Go outdoors and look for different flowers. What colour or colours are they? What patterns can you see? How big are they? Where do they grow on the plant? Do they appear as a single flower or in groups? Take photos of any flowers that you find and ask an adult to help display them on an interactive whiteboard.**

	discussions, noting down sources and reflectors on whiteboards or paper. Encourage the children to share their examples and create a class table of light sources and reflectors on the IWB. Address any misconceptions if they arise.	time to explore independently and provide whiteboards to record their observations. Display the Definitions poster and discuss the three words and their meanings. Then, discuss each object or material and ask children to share their observations about whether they made a shadow, linking them to the materials' opaque, translucent or transparent properties. K: Opaque objects cast dark shadows. Translucent objects cast lighter, blurry shadows.	properties they do. Encourage children to explore the modelling independently before asking them to write explanations on the Particle theory recording sheet. K: Particles make up all materials. The particles are close together and arranged in a regular pattern in a solid. In a liquid, the particles are close together but arranged randomly. In a gas, the particles are randomly arranged and far apart.	**characteristics. Animals can be divided into six main groups: mammals, reptiles, amphibians, birds, fish and invertebrates. These groups can be further subdivided. Classification keys are scientific tools that aid the identification of living things.**	when organising the animals into groups. Animals cannot make their own food and need to get nutrition from the food they eat. Carnivores get their nutrition from eating other animals. Herbivores get their nutrition from plants. Omnivores get their nutrition from eating a combination of both plants and other animals.	**Identify the flowers using books, the web or classification keys.** Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. **K: The plant's roots anchor the plant in the ground and transport water and minerals from the ground to the plant. The stem (or trunk) support the plant above the ground. The leaves collect energy from the Sun and make food for the plant. Flowers make seeds to produce new plants.** Flowers are important in the life cycle of flowering plants. The processes of a plant's life cycle include germination, flower production,

						pollination, seed formation and seed dispersal. Insects and the wind can transfer pollen from one plant to another (pollination). Animals, wind, water and explosions can disperse seeds away from the parent plant (seed dispersal).
Week 3	**Investigating reflective materials** **the meaning of the words reflect, reflective and reflector, then ask the children to describe materials with reflective properties using their prior knowledge and experiences. Provide the children with the Reflective materials investigation and model how to carry out the method. As they work, encourage them to record and sort the materials into groups on the Reflective materials recording sheet. Consider any materials they find**	**Observing changes in shadows** **Provide children with torches and interesting opaque objects, then give them a copy of the Changes in shadows recording sheet. Read the sheet together and ensure they understand what it asks them to do. Allow them to work in pairs to independently answer the questions on the recording sheet and look for patterns in their data. After completing their sheets, bring the children together and share their observations. Ensure all children understand how shadows change in size, direction and**	**Melting freezing, evaporation and condensation** **Ask the children, 'Can materials change from one state to another?' Share their initial ideas with examples. Place a chocolate button in front of each child and ask them to confirm the chocolate's state at room temperature and how they know. Now ask 'How can I make the solid chocolate into a liquid?' Children should recognise that adding heat will cause the chocolate to become a liquid. Ask them to hold the chocolate button in their hand and observe the changes. Ask, 'What**	**Classifying Creatures** Use classification keys (branching databases) to identify creatures that live in seas and oceans and sort them into groups, including cnidarian, mollusc, fish, mammal, arthropod, annelid, reptile or echinoderm. Watch film and documentary footage of a range of deep sea creatures to observe their features and behaviour. **K: Scientists classify living things according to shared characteristics. Animals can be divided into six**	**Dietary needs** Find out about the basic dietary needs of both domestic and wild animals by talking to a vet, veterinary nurse, animal handler or by searching online. Read the labels of common pet foods to find out what they contain and compare this with the diet of a wild animal. Identify the similarities and differences between an animal and a human diet and show their findings on a mind map or Venn diagram. **Identify that animals, including humans, need**	**Plants** Start by displaying a diagram that shows the parts of a flower alongside a real photo that clearly shows the same parts. Ask the children to match the parts on each image. Explain that flowers may have a different appearance and number of parts. Amaryllis, lilies, daffodils, tulips, gladioli, rhododendron, honeysuckle and poppies have differentiated parts that are easy to see. For a challenge, include primrose or

	difficult to classify and work together to add them to one of the groups. After sorting, ask the children to look for similarities and differences between the two groups. Ask questions to direct their thinking, such as 'Are the reflective materials smooth or rough?' and 'Are the reflective materials a similar colour?' Encourage the children to complete the questions on their recording sheet and discuss the need for reflective materials in everyday life. **K: Light is reflected from surfaces.**	**darkness when the torch is in different locations.** **K: Shadows change when the light source or the object moves. For example, when a light source is lowered, shadows grow longer.**	**process is happening to change the solid into a liquid?' Children should know the process is melting. After cleaning (or licking) the melted chocolate from their hands, show children the Changing states video. Discuss some of the vocabulary and the fact that temperature drives change of state. Provide the Changing states question sheet for children to record their learning about changes of state. A Changing states answer sheet is provided for children to check their work.** **Note: Some children confuse the processes of melting and dissolving. If children use dissolving instead of melting, explain that melting involves one material and dissolving involves two.** **K: Heating or cooling materials can bring about a change of state. This change of state can be reversible or irreversible. The temperature at which materials change state**	**main groups: mammals, reptiles, amphibians, birds, fish and invertebrates. These groups can be further subdivided. Classification keys are scientific tools that aid the identification of living things.**	**the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.**	sweet peas that have parts arranged differently, although the time of year may dictate the flowers you can access. Encourage the children to look very closely at their flower's parts, describe what they can see and ask questions. You could slice the ovary open with a sharp knife to show the children its unfertilised eggs. Produce and display a class data table or spreadsheet for them to record how many of each part the flowers have. **Investigate how water is transported within plants.**

			varies depending on the material. Water changes state from solid (ice) ⇌ liquid (water) at 0°C and from liquid (water) ⇌ gas (water vapour) at 100°C. The process of changing from a solid to liquid is called melting. The reverse process of changing from a liquid to a solid is called freezing. The process of changing from a liquid to a gas is called evaporation. The reverse process of changing from a gas to a liquid is called condensation.			
Week 4	**Recap that the Sun is the main source of light and heat for Earth, then ask how the Sun can be harmful to humans. Collect the children's answers, then ask if they know any ways to stay safe in the sunlight. Provide copies of the Sun safety poster. Encourage the children to read the poster and ask and answer questions about the information. Recap**	**How far can an arrow fly?** **Investigation – Devise a fair test to answer this question.** **With adult support, children start by making their own bows and arrows using simple instructions. They then practise firing until they are proficient. Now it's time to begin the investigation. First, the children mark up the length of an arrow in one centimetre**	The Water Cycle Demonstrate how to make a model of the water cycle, following the Model water cycle teacher information. Once set up, ask the children to predict what will happen and why, ensuring they use scientific terminology. Place the model somewhere warm and observe at regular intervals during the day. The children should see water	Deep sea adaptions Watch clips from the BBC's *Blue Planet* series about creatures of the deep. As they watch, make notes on how creatures have adapted for survival in this extreme environment. Select an adaptation from their observations and find out more. Decide how to present their information, making sure that it is clear	Why do we need a skeleton? Use models and diagrams of human and animal skeletons to locate bones, including the skull, ribs, spine (vertebrae), pelvis, femur, tibia, humerus, ulna and radius, as well as the joints where bones meet. Consider the importance of the skeleton for supporting and protecting vital organs, and as a	**Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.**

	that ultraviolet (UV) light ages and damages the skin, and SPF stands for sun protection factor. At the end of the session, read out the questions from the Sun safety quiz teacher information and ask the children to record their answers on paper. Encourage the children to mark their work and address any incorrect answers or misconceptions. ***K: Light from the Sun is damaging for vision and the skin. Protection from the Sun includes sun cream, sun hats, sunglasses and staying indoors or in the shade.***	**graduations. They then place the arrow on their bow and pull the bowstring back by 1 cm, using the graduations as a guide. The children fire the arrow, measure the distance it travels in standard units, and record in a prepared table. They return to the launch line, pull the bowstring back by 2 cm, fire again and repeat the measuring and recording. The children continue in the same way, pulling the bowstring back by an extra centimetre each time, until they reach the end of the arrow. They display their final results in a bar chart.** **Conclusion** **Bows and arrows have been used for hunting and as weapons for thousands of years.** ***K: The further the bowstring is pulled back the further the arrow travels.*** **Assessment of Working Scientifically focus.**	droplets appearing on the cling film from water that has evaporated from the bowl and condensed on the cling film. These droplets should then run down the cling film and collect in the glass. Encourage the children to relate what they see happening. At the end of the day, remove the glass and, if possible, measure the volume of water collected. Ask the children what factors they think might affect the rate of evaporation and, therefore, the amount of water collected in the glass. For example, the temperature, surface area or volume of the water, or the temperature of its surroundings.	and easy to understand. **K: An adaptation helps an animal or plant survive in its habitat. If living things are unable to adapt to changes within their habitat, they are at risk of becoming extinct.** **Explain how adaptations help living things to survive in their habitat.**	framework for muscles, movement and blood production. Choose a favourite terrestrial predator, drawing a scientific diagram of it and identifying and naming both its body parts and the adaptations that make it amazing. **K: Humans need the skeleton and muscles for support, protection and movement.**	

Week 5	**Exploring Shadows** **Take the children outside on a sunny day to find shadows of all shapes and sizes – big, long, wide, interesting and beautiful. Encourage children to take photos of shadows they observe. Back in the classroom, upload and share the photos, discussing what they can see and identifying the objects that made them. After sharing, discuss what a shadow is, based on their prior knowledge and observations, and address any misconceptions. Share the Shadows presentation to consolidate their understanding and see if they can guess the objects that made the shadows. Model how shadows are made using a torch or projector, blocking the light source with opaque objects. To check children's understanding of shadows, ask them to**	**How far can an arrow fly?** **Investigation – Devise a fair test to answer this question.** **As above:** **Make a written representation of the investigation and present results.** **Assessment of working scientifically**	**Investigation of the Water Cycle (as above)** Explain that they will be investigating the rate of evaporation. In groups, ask the children to decide which variable they would like to test and, with support, plan their investigation using the Investigation planning sheet. As they carry out their investigations, set up the original model water cycle to use as a control to which the children can compare their results. After carrying out their investigations, encourage the children to report back their findings verbally. Assessment of working scientifically	**Assessment** **Head start topic test** **Year 4 Head Start Progress test 2**	**Consequences and owl pellets (if possible)** Watch video and documentary footage of different predatory birds catching and eating their prey. Consider why predators must kill and eat other animals and predict what would happen to them if food became scarce. Make a food chain to show the prey and predator relationships for a chosen bird of prey. Watch footage of an owl producing a pellet of indigestible material. Predict what the pellet might contain before dissecting a real owl pellet. Use their observational skills to discover what the owl has eaten. Separate pieces of bone and other materials found in the pellet, and wash carefully in a sieve. Identify any bone fragments before piecing the skeleton together. Take a photograph of the bones or skeleton before labelling key	**Assessment** **Head start topic test** **Year 4 Head Start Progress test 3**

	complete the Shadows question sheet and discuss their answers as a class. If time allows, take children back outside later in the day and see if the shadows have changed from earlier. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. ii) Find patterns in the way that the size of shadows change.				finds and features. Work in small groups to make a menu for an owl's ideal three course meal and then present this to the class to report upon the discoveries made in their enquiry. **Animals cannot make their own food and need to get nutrition from the food they eat.** **Carnivores get their nutrition from eating other animals.** **Herbivores get their nutrition from plants.** **Omnivores get their nutrition from eating a combination of both plants and other animals.**	

Week 6	**Assessment** **Head start topic test**	**Assessment** **Head start topic test** **Year 4 Head Start Progress test 1**	**Assessment** **Head start topic test**	**This term can be 5 weeks, so kept free to ensure coverage.**	**Assessment** **Head start topic test**	**Assessment** **End of year Head start test.**