Birchwood Science Curriculum Map

Year Group	Substantive Knowledge	Disciplinary Knowledge	Vocabulary	Resources
Reception - autumn	**Autumn-1** <u>Understanding the World</u> -Know that all humans have a body. -Know that everyone has individual features. -Know how to keep their bodies healthy, e.g. eating healthy food, exercising, screen-time, etc. -Know that we have a skeleton. -Know where to find their skeleton. -Know what skin is. -Know what a bone is. -Know the names of some body parts – support with resource (Head Shoulders Knees and Toes and Hold Ya Head) -Know that they have 5 senses. <u>Communication and Language</u> -Know that an instruction can have more than one part. -Know a question is used to help confirm or challenge understanding. -Know that discussions require listening, speaking and attention. <u>Personal, Social and Emotional Development</u> -Know that unique means that they are one of a kind. -Know that similarity means the same. -Know that difference means not the same. -Know why washing hands is important to keep healthy.	**Autumn- 1** <u>Understanding the World</u> -To identify their own body and how it is different from the people around them. -Identify that to have a healthy body we must eat well, sleep well, exercise and not have too much screen time. - Identify their own unique features and those of friends.(hair, height, skin colour, gender, glasses) -Observe their own features using a mirror. They can then make pictures/paintings using the correct colours. - Identify their skeleton underneath their skin. - Use songs and rhymes to help identify parts of their body. -Explore their five senses – sight, hearing, touch taste and smell. -Use feely boxes to explore their different senses. <u>Communication and Language</u> -Follow one-step instructions and beginning to follow two-step instructions. -Understand and can respond appropriately to a variety e.g. Why…? Do you think…? What…? -Ask questions to clarify instructions. Take part in discussions in Circle and milk time, e.g. What makes you unique? Is everyone in the world the same? Are humans the same as animals? <u>Personal, Social and Emotional Development</u> -Talk about similarities and differences between themselves and their friends. -Manage their toileting routines and know that the importance of hand washing.	Human, body, individual, feature, unique, healthy, food, exercise, skeleton, skin, bone, senses, hearing, sight, taste, ,touch, smell, height, skin colour, eyes, hair, gender, boy, girl, mirror, hand-washing.	Books, pictures, skeleton, mirrors, feely boxes, rhymes,

	Autumn - 2 <u>Understanding the World</u> -Know that there are four seasons. -Know the names of the 4 seasons and the order they are found. ((Autumn, Winter, Spring and Summer) -Know the common features of Autumn, Winter, Spring and Summer. -Know the how to identify between snowing, sunny, raining, foggy, stormy, cloudy and windy. - Know what a tree is. -Know some animals hibernate for the winter such as a bear, hedgehog, mouse -Know not all animals hibernate – cats, dogs, guinea pigs. <u>Communication and Language</u> -Know that an instruction can have more than one part. -Know a question is used to help confirm or challenge understanding. -Know that discussions require listening, speaking and attention. -Know and use new vocabulary. -Know vocabulary connected with trees -, leaf, stem, trunk, branch, <u>Personal, Social and Emotional Development</u> -Know what tools they will need to complete a task e.g. pencils for drawing/writing, magnifying glass for looking closely, sieves for separating,	**Autumn - 2** <u>Understanding the World</u> -Observe changes in the local environment throughout autumn and winter. -Identify different weather types and describe what they look & feel like. -Identify the most common weather feature for each of the seasons. -Identify the seasons and discuss features of each. -Recognise the season of Autumn where the leaves on some trees change colour and fall off.. - Recognise the season of winter where very little grows because of the cold. - Recognise the season of spring, plants start to grow because of the warmth. -Recognise that in the season of summer the weather is the hottest and driest time of the year. -Identify names of some parts of a tree – trunk, roots, branches and leaves -Make observations of wooded area, flower beds and school environments. -Investigate hibernation and what animals may or may not hibernate. <u>Communication and Language</u> -Follow one-step instructions and beginning to follow two-step instructions. -Understand and can respond appropriately to a variety e.g. Why…? Do you think…? What…? -Ask questions to clarify instructions. Take part in discussions in Circle and milk time, e.g. What is the weather like today, yesterday. What season are we in how do we know. <u>Personal, Social and Emotional Development</u>. -Select tools and resources that they need to complete a task of their own choosing.	Season, Autumn, Winter, Spring, Summer, weather, rain, rainy, clouds, thunder, sunny, windy, snowing, snow, warm, cold, hot, leaves, fall, grow, plants, trunk, roots, branch, leaves, Hibernation, sleep, collect, gather, , mouse, bear, hedgehog	Use NPP- weather to a virtual experience of all seasons.
Reception -spring	**Spring – 1** <u>Understanding the World</u> -Know that some things can change, e.g. water into ice, chocolate can be melted, etc. Ice melting experiment -Know that extremely low temperatures will cause water to freeze and become ice. -Know that ice can melt when temperatures rise. -Know the names of common materials and objects from their own environment. -Know that the weather in the Polar regions is significantly different to that in the UK. -Know that snow can be made by humans in places such as the Snowdome. <u>Communication and Language</u> -Know that instructions can come in more than 1 step. -Know the structure of how to speak in a full sentence. -Know they can extend their spoken language by using connectives: and, because, then, but. -Know that talking with others can help when faced with a problem.	**Spring 1** <u>Understanding the World</u> -Experiment with ice and water to see the changes that can be made. -Investigate low temperatures and what effect it has on water to freeze and become ice. -Make observations of the melting process. -Experiment with other things (salt, cold water, paper and sand) to see if they cause ice to melt. -Identify some common weather / environment and animals found in the polar regions. (snow, glaciers, mountains) -Take a trip to the Snowdome to experience real snow. <u>Communication and Language</u> - Follow 2-step instructions. -Ask why questions -Use complete sentences in their everyday talk. -Begin to connect one idea or action to another using connectives: and, because, then, but. -Describe events in detail and use sequencing words: before, next, after, then. The events will be heavily based on experiences in their own lives. -Use talk to help them work out problems and possible solutions. -Compare different materials and objects using recently introduced vocabulary. -Offer explanations for why things might happen, making use of recently introduced vocabulary. -Explain in words the differences between a Penguin and a Polar bear. <u>Personal, Social and Emotional Development</u> Identify that people can live in different environments and understand how these can differ from their own. Explain why it is important to brush their teeth for 2 minutes. Observe what happens to teeth when they decay. Children have confidence in their own abilities.	Arctic, Antarctic, Polar, region, temperature, freeze, ice, melt, frozen, observe, experiment, investigation, warm	-NPP: the Arctic, ice, snow, ice trays, warm water, photos, salt, paper.

	Spring - 2 <u>Understanding the World</u> -Know a material is what objects are made of. -Know that materials have different qualities. -Know that different materials are better than others when constructing. -Know what a mirror is. -Know that a mirror has a reflective surface. -Know what a magnet is. -Know that magnets can attract some metals. -Know that some materials such as plastic and wood are not magnetic. -Know what floating is. -Know what sinking/submerging is. -Know that hatching is the process of a chick exiting an egg. -Know that an incubator provided heat for the chick to hatch. -Know that being alive is when you have a heartbeat. -Know that death is when a heart stops beating. -Know a carnivore is a meat eater. -Know a herbivore is a plan eater. -Know that extinct means no longer living, and not found alive anywhere on the planet. <u>Communication and Language</u> -Know that instructions can come in more than 1 step. -Know the structure of how to speak in a full sentence. -Know they can extend their spoken language by using connectives: and, because, then, but. -Know that talking with others can help when faced with a problem.	**Spring - 2** <u>Understanding the World</u> -Explore and describe some different materials (Cork, plastic, metal, cardboard) -Use their senses to describe different materials. -Create a Dinoscape using their knowledge of materials. -Explain why they have chosen the materials they have. -Explore mirrors, magnifying glasses and magnets. -Discuss mirrors, magnifying glasses and magnets. -Be confident to say what mirrors, magnifying glasses and magnets can be used for. -Explore floating, sinking and submerging. -Investigate what materials they could use to make a boat that would float -Observe chicks hatching in an incubator. -Understand the vocabulary connected to chicks hatching (Chicken, chick, egg, young, adult, hatch, incubator, feathers, beak) -Identify living things (birds, humans, insects, animals) -Identify things that are not living (toys, furniture etc) -Explain that death is when life ends. -Investigate the different diets of dinosaurs. -Identify meat eating dinosaurs such as a T-Rex and refer to them as carnivores. Identify the plant eating dinosaurs that eat foliage and greens and refer to them as herbivores(Stegasorus). -Discuss the meaning of extinct <u>Communication and Language</u> -Follow 2-step instructions. -Ask why questions -Use complete sentences in their everyday talk. -Begin to connect one idea or action to another using connectives: and, because, then, but. -Describe events in detail and use sequencing words: before, next, after, then. The events will be heavily based on experiences in their own lives. -Use talk to help them work out problems and possible solutions -Compare different materials and objects using recently introduced vocabulary.	NPP- Dinosaurs Materials, cork, metal, plastic, cardboard, mirror, magnifying glasses, magnet, attract, reflective, float, sink, submerge, floating, submerging, sinking, hatch, chick, chicken, duck, goose, egg, incubator, feathers, beak, living, dead, alive	
Reception - summer	**Summer -1** <u>Understanding the World</u> Know there is a difference between submerging and sinking. Know that a shadow is made from the absence of light. Know that Africa as a continent has much warmer weather than the UK. Know that in Summer we have hotter days, wear less clothing and apply sun cream <u>Communication and Language</u> -Know that instructions can come in more than 1 step. -Know the structure of how to speak in a full sentence. -Know they can extend their spoken language by using connectives: and, because, then, but. -Know that talking with others can help when faced with a problem. <u>Personal, Social and Emotional development.</u> -Know that perseverance is when you don't give up.	**Summer - 1** <u>Understanding the World</u> Explore floating, sinking and submerging in more detail. Investigate how we make shadows. Understand that the common weather in Africa is very different to the UK. Identify the common features of the Summer season. <u>Communication and Language</u> -Follow 2-step instructions. -Ask why questions -Use complete sentences in their everyday talk. -Begin to connect one idea or action to another using connectives: and, because, then, but. -Describe events in detail and use sequencing words: before, next, after, then. The events will be heavily based on experiences in their own lives. -Use talk to help them work out problems and possible solutions -Compare different materials and objects using recently introduced vocabulary. <u>Personal, Social and Emotional development.</u> -Show perseverance and determination to do well in their learning and activities. -Regulate their own behaviour in a variety of different situations. **-F**ollow instructions with multiple steps.		

	Summer 2 <u>Understanding the World</u> -Know that plants grow from a seed. -Know that plants need water, soil and sun to grow. -Know the parts of a plant – roots, stem, leaves, flower -Know that mini beasts are insects and arachnids -Know how to identify a worm, spider, ant, snail and caterpillar. -Know Spiders have 8 legs. -Know insects have 6 legs. -Know a snail has a shell. -Know a worm has no bones. -Know a caterpillar metamorphosises into a butterfly. -Know the life cycle of a caterpillar. <u>Communication and Language</u> -Know that instructions can come in more than 1 step. -Know the structure of how to speak in a full sentence. -Know they can extend their spoken language by using connectives: and, because, then, but. -Know that talking with others can help when faced with a problem.	**Summer 2** <u>Understanding the World</u> -Investigate seeds, what they look like, feel like and smell like. -Compare different seeds, sizes, shapes and what they become. -Explore what seeds need to grow in to plants. -Discuss the process of planting a seed and growing it into a plant. -Identify the different parts of a plant (roots, stem, leaves, flower) -Participate in growing a plant from seeds. -Identify a range of mini beasts – ladybird, spider, butterfly, ant, worm - Explore the life cycle of a butterfly. -Compare different mini beasts (snail, spider, worm, caterpillar) <u>Communication and Language</u> -Follow 2-step instructions. -Ask why questions -Use complete sentences in their everyday talk. -Begin to connect one idea or action to another using connectives: and, because, then, but. -Describe events in detail and use sequencing words: before, next, after, then. The events will be heavily based on experiences in their own lives. -Use talk to help them work out problems and possible solutions -Compare different materials and objects using recently introduced vocabulary.		

Y1 autumn	**Autumn 1- Everyday materials** -Know that the name of an object and the material from which it is made are different. -Know the names of a variety of everyday materials, including wood, plastic, glass, metal, water, and rock -Know the names of a variety of properties for everyday materials with support. (rough, smooth, shiny, dull, stretchy, (not) bendy, stiff, heavy, light, big, small, soft, hard, sink, float, soaks water up, does not soak water up). -Know that a magnifying glass can be used to see more details of an object. -To get the best view of a subject using a magnifying glass, hold the lens as close to the eye as possible and bring the object up in front of the lens until it is in focus. -Know that evidence can be used to answer questions. -Know have building materials changed over time and the impact this has had on people. (e.g. 1907 plastic invented- originally viewed as great but now considered environmentally damaging, steel invention led to large bridges and ships being built). **Autumn 2- Seasonal Change** -Know the seasons move in a cycle. -Know the names of the 4 seasons in order and know which months belong to which season. -Know the most common weather features for each of the seasons. -Know Autumn is the time of year when hibernating animals gather and store food. -Know Winter is the time of the year when some animals hibernate -Know Spring is the time of year when baby animals are born because there is enough food and warmth. -Know Summer has longer days than winter. -Know headings and labels are used in pictograms to organise information. -Know observations can be used as evidence when answering questions. -Know that weather forecasting has changed over time. In the past people used their knowledge of the seasons and observation of the sky to determine the weather. Today, satellites in space show us the weather that is coming our way for the coming days and weeks helping us plan ahead for farming, picnics and avoid danger.	**Autumn 1- Everyday materials** <u>Identifying and classifying</u> -Observe and describe a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. - Choose appropriate equipment to make observations (touch, magnifying glasses, cameras) to look closely at materials -Group materials based on similarities and differences <u>Comparative and Fair Testing</u> -Investigate how bendy materials are, how much water they soak up and whether they float. -Use their observations to suggest answers to questions: What is the best material for an umbrella? ...for lining a dog basket? ...for curtains? ...for a bookshelf? ...for a gymnast's leotard? **Autumn 2- Seasonal Change** <u>Observing</u> -Describe the changes in the weather across the four seasons.(go for walks around school looking for changes- leaf colours, acorns, buds etc, take pictures on I-Pads to compare). -Visit & Take photos of a chosen tree / plants at different points in the year and describe what they see, comparing and contrasting changes. -Gather information to show what the weather is like each day and record on a pictogram. -Observe changes to the weather (Use charts / pictograms to track and compare the weather over a month. Do in winter and in summer to compare). -Over the course of the year, compare the hours of daylight during the year <u>Pattern seeking</u> -Identify when in the year there is more daylight / it is the driest / wettest / cloudiest, fruit appears	rough, smooth, shiny, dull, stretchy, (not) bendy, stiff, heavy, light, big, small, soft, hard, sink, float, soaks water up, does not soak water up, wood, metal, plastic, fabric, glass, rock, water, ice, solid, liquid material, object, property question, answer, observe, equipment, identify, sort, group, compare Season, weather, month, winter, spring, summer, autumn, weather, wind, rain, snow, hail, sleet, fog, sun, hot, warm, cold, hibernate, cycle, (names of months of the year) question, answer, observe, equipment, identify, sort, group, compare,	https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 KS2 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q KS1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP- materials posters / books, samples in the science cupboard, https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP-seasons posters / books, samples in the science cupboard, observation of orchard / wooded area Local walk in spring & autumn to notice changes

Y1 Spring	**Spring 1- Animals including humans** - Know the names a variety of common animals including: toad, newt, badger, hedgehog, bear, chicken, cow, horse, mouse, deer, elephant, cat, dog, tiger, lion, shark, fox, eagle, snake - Humans are animals - The name for basic parts of an animal's body including: scales, fish, gills, tail, claws, talons, paws, fur, feathers, wings, skin, beak, teeth, hooves, antlers, tusks, trunk, - Know that animals that only eat other animals are called carnivores. - That animals that only eat plants are called herbivores. - That animals that eat both plants and other creatures are called omnivores. - Know that senses are the way our bodies gather information about the world around us. - Know the 5 senses of the human body are sight, hearing, taste, smell and touch - Know the parts of the body that gather information about the world around us include our eyes (sight), ears (sounds), nose (smells), tongue (tastes) and skin (touch) -The ears, eyes, nose and tongue are locate only on our head but skin covers the whole surface of our outer body. -Know a magnifying glass can be used to see more details of an object. -To get the best view of a subject using a magnifying glass, hold the lens as close to the eye as possible and bring the object up in front of the lens until it is in focus. -Know that evidence can be used to answer questions Know that people with poor eye sight have been helped by the invention of glasses and magnifying glasses. Before this, people would not have been able to read or do certain jobs because of their difficulty. **Spring 2- Forces** - Know the actions of pulling, pushing and twisting are examples of forces. - Forces can move an object or speed it up. - Forces can stop an object or slow it down. - Forces can change the direct an object moves in. - Forces can change the shape of an object. -Know that data includes any measurements that have been taken or information about what has been observed. -Data and observations should be used as evidence when answering enquiry questions. -Know how the materials and features of toys changed over times. (e.g. wooden rocking horse, peg dolls, wooden ball and cup, glass marbles, metal bike frame, plastic Lego & plastic dolls, electronic toys).	**Spring 1- Animals including humans** <u>Identifying and classifying</u> -Observe and describe a variety of common animals. - Choose appropriate equipment to make observations (touch, magnifying glasses, cameras) to look closely at animals / pictures of animals. -Group animals based on similarities and differences - Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense - Use technology to take images of faces and label the parts of the human body and associated senses. - Describe and compare the structure of a variety of common animals through labelled diagrams / Write a 'What am I riddle?' <u>Observing</u> -Describe the different information each of their body parts collected from different environments, e.g. outside they can hear the birds, smell the cut grass, feel the breeze etc <u>Comparative and fairing</u> -Investigate which part of the body is the most sensitive to touch. (children explore feeling different fabrics with different parts of their body, e.g. finger tips, elbow, knee etc). **Spring 2- Forces** <u>Identifying and classifying</u> - Use sorting rings to identify which forces are used to operate a range of toys / playground equipment / every day actions and materials & doughs in to those that return to their original shape and those that don't once the force stops is released. <u>Pattern seeking</u> -Ask simple questions about what effect changing the force will have on the object, e.g. Do bigger people have bigger pushes? Are both hands as strong/good at pushing? -Identify the connection between greater forces moving objects further / faster or slowing them down / stopping them more quickly / changing their shape more. <u>Comparative and fair testing</u> - Investigate which water squirter / pistol squirts water the furthest? Or Which car / boat travel the furthest? Or Which ball bounces the highest? - Gather and record data by marking the height / distanced travelled by different objects. <u>Observing</u> - Describe what they see and changes they notice. Visit & Take photos of a chosen tree / plants at different points in the year comparing and contrasting changes.	chicken, chick, egg, young, adult, hatch, tadpole, frog, caterpillar, butterfly, penguin, polar bear, artic fox, elephant, giraffe, lion, snake, rhino, hippo, jungle, desert, fish, birds, humans, pets, herbivore, omnivore, carnivore, toad, newt, badger, hedgehog, bear, chicken, cow, horse, mouse, deer, elephant, cat, dog, tiger, lion, shark, fox, eagle, snake, scales, fish, gills, tail, claws, talons, paws, fur, feathers, wings, skin, beak, teeth, hooves, antlers, tusks, trunk, senses, taste, vision, sight, touch, smell, hearing, tongue, nose, ears, eyes, skin, ears, head, neck, knees, elbows, neck, mouth, question, answer, observe, equipment, identify, sort, group, compare, Force, push, pull, twist, movement, fall, rise, roll, slide, topple, crumple, speed up, slow down, faster, slower, further question, answer, observe, equipment, identify, sort, group, compare,	Use real animals or photos not clip art *Invite animal man in with birds, mammals, reptiles* https://www.theanimalman.co.uk/school-visits https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP- animals posters / books, propagator sets in the science cupboard, seeds and compost in shed, kitchen garden, flower beds and orchard Toys to compare the impact of forces. https://arkkingsacademy.org/sites/default/files/Year%201%20Autumn%201%20Knowledge%20Organiser%20-%20Toys.pdf

Y1 Summer	**Summer 1- Plants** -Know the names of a variety of common wild plants including: *dandelion, daisy, fox glove, bluebell, dock leaves, nettles* -Know the names of a variety of garden plants including: *rose, tulip, daffodil, sunflower, rosemary, mint* -Know trees that keep their leaves all year are called evergreen and trees that lose their leaves in winter are deciduous. -Know the names of a variety of deciduous and evergreen trees including *oak, chestnut, sycamore, pine, holly* -Know the name of the parts that make up the basic structure of a variety of common flowering plants, including trees: *seed, bulb, leaf, stem, trunk, branch, root, petals, blossom, bud, fruit, bark, deciduous, evergreen.* -Know vegetable is a plant or part of a plant used as food, such as a cabbage, potato, carrot, or bean. - Know it is not safe to eat unknown plants or parts of plants. - Know diagrams can be used to record observations and need to include all the details noticed. - Know cubes can be used to measure height. -Know a magnifying glass can be used to see more details of an object. -To get the best view of a subject using a magnifying glass, hold the lens as close to the eye as possible and bring the object up in front of the lens until it is in focus. - Know identification sheets for plants can be used by spotting similarities in the shape and colour of the leaves and petals. -Know observations, including measurements, can be used as evidence when answering questions. -Know that Beatrix Potter helped people understand more about mushrooms and toadstools. She did this by using her love of art and science together, to paint detailed fungi she saw. She made observations and conducted experiments which helped people understand how they reproduced. She inspired other women to take an interest in science at a time when they were not allowed access to higher education, were not allowed to vote and considered the property of their husband.	**Summer 1- Plants** <u>Identifying and classifying</u> - Choose appropriate equipment to make observations (touch, magnifying glasses, cameras) to look closely at plants. - Use plant identification sheets to name plants in the school grounds / local area by identifying similarities and differences in leaf/petal shape and colour. -Use sorting rings to group evergreen and deciduous trees. <u>Observing</u> -Describe the changes they see in a bean plant grown from seed (placed in a clear container so roots can be seen) --Visit & Take photos of a chosen tree / plants at different points in the year and describe what they see, comparing and contrasting changes. - Record their observations by creating diagrams with labels. - Measure the height of their bean plant each week in cubes. <u>Pattern seeking</u> -Identify the locations around school that have the most/least plant life.	seed, bulb, grow, bigger, smaller, taller, shorter, flower, blossom, leaf, stem, trunk, branch, alive, not alive, evergreen root, petals, blossom, bud, fruit, vegetable, bark, deciduous, evergreen, question, answer, observe, equipment, identify, sort, group, compare.	

Y2 autumn	**Autumn 1 & 2- Materials & enquiry types** -Know what properties common objects need to have, including a window (transparent), a chair (rigid), umbrella or tent cover (waterproof, light & flexible), dish cloth (absorbent), Wall (rigid & opaque), curtain/blind (flexible & opaque), gymnast's outfit (stretchy, smooth, opaque), nail file or sand paper (rough), raft / life ring (float), anchor (sink) -Know the actions of squashing, pulling, pushing, twisting, bending are examples of forces. -Know that forces can change the shape of objects. -Know that comparative & fair testing, observing, pattern seeking, identifying & classifying and researching are methods for answering scientific questions. -Know that who, what, when, where, how & why start questions. -Know photographs can be used as diagrams by adding annotations, labels & titles. -Know headings in tables & charts organise data so answers to questions can be quickly found. -Know data and observations should be used as evidence when answering enquiry questions. -Know that new materials can be invented and one example of this includes how in 1902, inventor Edgar Purnell Hooley created Tarmacadam, commonly known as Tarmac. This is a road surfacing material made by combining crushed stone, tar, and sand. It did not become water logged or muddy and lasted longer so it made it easier for people to travel by road.	**Autumn 1 & 2- Materials & enquiry types** <u>Identifying and classifying</u> - Use tables to gather and organise data about objects and materials such as name of object, name of material, properties, suitability for purpose - Use Venn diagrams to compare properties of materials. <u>Comparative and Fair Testing</u> -Investigate how absorbent, rigid / flexible, transparent / opaque materials are. -Use observations to suggest answers to questions: What is the best material for a tent cover? ...for a raft / life ring? ...for curtains? ...for a mop? ….for a diving board? ...for a gymnast's leotard? -Investigate how the shapes of solid objects can be changed by squashing, bending, twisting and stretching using playdough. -Gather and record data by annotating photographs (of the playdough manipulated) <u>Pattern seeking</u> -Investigate if there is a link between pairs of properties such as: absorbency and stretchiness. -Use Venn diagrams to identify when connections always/ sometimes/never or mostly occur.	Material, object, property, rough, smooth, shiny, dull, stretchy, (not) bendy, stiff, heavy, light, big, small, soft, hard, sink, float, soaks water up, does not soak water up, wood, metal, plastic, fabric, glass, rock, water, ice, solid, liquid Force, push, pull, fall, rise, roll, slide, topple, crumple flexible, rigid, absorbent, transparent, opaque, squeeze, squashing, bending, twisting observe, identify, sort, group, compare, comparative test, diagram, record, data, chart, classify, research, pattern seeking	Resources to create a material trail using QR codes https://www.pstt-cpd.org.uk/ext/cpd/primary-qr-site/ https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, posters / books, samples in the science cupboard,

Y2 spring	**Spring 1 Animals including Humans** - Know that a life cycle shows the creation of a young living thing, its growth into adulthood and the reproduction of new offspring - Know the young creation of a living thing (plant or animal) is called the offspring. - Know the names of young animals and what they look like, including: *calf (cow & elephant), foal, puppy, kitten, cub (bear, lion, fox), piglet, fawn, duckling, larva* - Know the basic needs of animals, including humans, for survival are shelter from the elements, water, food and air. *(note that creatures such as fish absorb dissolved oxygen from water & excrete CO2 so still need air)* - Know that regular exercise helps develop strong muscles & bones, flexibility, good posture, keeps energy levels high and helps people to feel good mentally. - Know the name of a variety of food from the different food groups *(does not need to know the scientific terms yet- diary, carbohydrate etc). Including: meats, fish, eggs, fruit & vegetables, bread, cereal, pasta, rice, butter, oil, sugar* - Know that a balanced diet includes a variety of food with fruit, vegetables, breads, pasta, rice & cereals making up the largest part; and meat, fish & eggs a smaller part and a tiny part is sugar and butter/oil - Know that good personal hygiene reduces the chance of illness. - Know that good personal hygiene includes: regular washing of hands, bathing or showering, wearing clean clothes, using a tissue to blow our nose then binning it. - Know research can include the use of search engines, books and people with knowledge on the subject. - Know diagrams include all the details seen, labels & titles. Headings in tables & charts organise data - Know between 1913 and 1948, scientists discovered vitamins helped keep the body healthy. That having the right amount of vitamins stops people getting certain diseases and health problems e.g. rickets and scurvy which effected the bones and skin. People now knew how to avoid certain illnesses by changing their diet. **Spring 2- Living things and their habitats** - Know living things grow, take in & give out air and reproduce. (note, plants do not breath- breathing is the physical process of exchanging gasses, respiration is a chemical process that takes place at a cellular level that all living things do- respiration is KS3) - Know things that were once alive are made from dead plants and animals.(note that shells, feather & bark are classed as once living because they were grown and once part of a living organism). -Know things that were never alive are made from materials like plastic, metal, sand, rock and glass. - Know that a habitat provides food, water, air, shelter and space to grow & reproduce. - Know woodland, ocean, coast, urban and pond are the names of British habitats. - Know a microhabitat is a very small habitat such as inside a rotting log, under a stone, or inside leaflitter. - Know most living things live in habitats to which they are suited. - Know a food chain shows how each animal gets its food and the arrows in a food chain mean 'is eaten by'. -Know animals that eat other animals are called predators and the animals that they eat are called prey. - Know that botanist Arthur Tansley developed people's understanding of habitats in 1935 by explaining that the physical environment (weather and habitat), animals and plants all interacted and had effects on each other. He created the word ecosystem to explain this and teach people how to conserve wildlife. E.g. if people filled in all the ponds to build houses, frogs would have no where to breed and would die, that would mean there isn't enough food for herons and they too would die.	**Spring 1 Animals including Humans** Identifying and classifying - Groups images of food in different ways (healthy /unhealthy, plants/animals/grains/products made from milk/fats,) - Identify the young of animals by matching photographs including: cow, butterfly, frog, lion, deer, duck, dog, horse, pig, ladybird, cat, bear. Describe the similarities and differences between the adult and offspring. Research - Discuss what we would need to survive a trip to Mars (using themselves as the people with knowledge). - Find out what pet fish, fox and blackbird need to survive- (include why fish often need a pump). - Identify what all animals need to survive by comparing their findings. - Find out what a balanced diet is and use it to design a meal. Describe what makes it healthy/unhealthy. Observing - Keep a food and drink diary for a week. - Describe what makes it healthy / unhealthy - Describe the changes a new born baby goes through. Use a video / zoom or invite a parent of a new baby in regularly to observe changes over time. Complete a simple table of observable changes, include length, weight as well as noting observable changes in ability and behaviour of the infant. Comparative and fair testing - Gather information about how different exercise effects the body by recording data in a table. e.g. running for 1 minute, reading for 1 minute, playing catch for 1 minute etc. sweaty, hot, fast breathing, heart rate, no change etc - Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene- create an information booklet for reception children. **Spring 2- Living things and their habitats** Identifying and classifying - Compare the differences between things that are living, dead, and things that have never been alive and sort using charts. Group living things by using the habitat they belong to. Research - Find out and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other. Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. Enquiry type - Identify different ways answers to questions can be investigated. Show images related to the topic and ask children to generate questions for what they would like to know. Discuss with adult support, which of the 5 scientific enquiry approaches they think would be best as a vehicle for finding the answer.	herbivore, omnivore, carnivore, toad, newt, badger, hedgehog, bear, mouse, deer, elephant,shark, fox, eagle, snake, scales, fish, gills, tail, claws, talons, paws, fur, feathers, wings, skin, beak, teeth, hooves, antlers, tusks, trunk, offspring, life cycle, calf, foal, puppy, kitten, cub, piglet, fawn, duckling, larva, survival, basic needs, balanced diet, exercise, hygiene, observe, identify, sort, group, compare, comparative test, diagram, record, data, chart, classify, research, pattern seeking herbivore, omnivore, carnivore, toad, newt, badger, hedgehog, bear, mouse, deer, elephant,shark, fox, eagle, snake, scales, fish, gills, tail, claws, talons, paws, fur, feathers, wings, skin, beak, teeth, hooves, antlers, tusks, trunk, living, dead, never alive, habitats, micro-habitats, food-chain, predator, prey, human, healthy, leaf litter, shelter, coastal, woodland, ocean, urban, conditions hot/warm/cold, dry/damp/wet, bright/shade/dark observe, identify, sort, group, compare, comparative test, diagram, record, data, chart, classify, research, pattern seeking	**Use real animals or photos not clip art** https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP- Humans, posters / books, models in the science cupboard, Ankerwoods trip Visitor: A-life Health & Fitness Workshops for Schools, 01183 343590, 07816 210230 The History and Discovery of Vitamins Through The Ages - What's Up, USANA? (whatsupusana.com) https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP-habitats posters / books, mini-beast samples in the science cupboard, Trip to Twycross zoo- science workshop at the zoo on either habitats or food chains Animal man visitor (mini-beasts) Optional extra

Y2 Summer	**Summer 1-Plants** - Know the vocabulary seed/ bulb/bean, germination, shoot, seedling, mature plant is used to name stages of growth within the plant life cycle. - Know plants need water, light and a suitable temperature to grow and stay healthy - Know diagrams can be used to record observations and need to include all the details noticed. -Know a magnifying glass can be used to see more details of an object. -To get the best view of a subject using a magnifying glass, hold the lens as close to the eye as possible and bring the object up in front of the lens until it is in focus. -Know that a ruler measures length in centimetres and that you need to start from 0 and not the end of the ruler when measuring. - Know that scientific ideas change over time. For example, the tobacco plant was introduced to Britain 500 years ago and was originally grown for medicine. Now we know it can cause major health problems so there are laws about selling it.	**Summer 1-Plants** <u>Identify and classify</u> -Describe and sort bulbs, beans and seeds based on shape, colour, size, texture <u>Observation</u> - Use a magnifying glass to make careful observations and drawings of seeds, beans and bulbs. - Record the growth of a variety of plants as they change over time from a seed or bulb, e.g. cress, sunflower seed, gladioli bulb. - Describe changes between stages in plant growth. Measure changes in height with a ruler to the nearest cm. <u>Fair and comparative testing</u> - Investigate if plants need light, water & a suitable temperature to stay healthy by placing cress seeds in different locations (note, fridges will have no light)	seed, bulb, flower, leaf, stem, trunk, branch, root, petals, blossom, bud, fruit, vegetable, bark, deciduous, evergreen,, germination, shoot, seedling, mature plant, healthy, survival, environment, temperature observe, identify, sort, group, compare, comparative test, diagram, record, data, chart, classify, research, pattern seeking	https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z6svr82 https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, NPP-plants posters / books, propagation kits in the science cupboard, seeds and compost in shed, kitchen garden, flower beds, orchard Walk around local area George Washington Carver's contributions to agriculture in the U.S. - 4-H Global & Cultural Education (msu.edu)

Y3 autumn	**Autumn 1 Plants** - Know nutrients are substances needed by living things to grow and survive. - Know the roots anchor the plant into the ground and absorb water and nutrients from the soil. - Know the stem holds the plant up and carries water and nutrients from the soil to the leaves. - Know a trunk is the stem of a tree. - Know the leaves make food for the plant using sunlight and carbon dioxide from the air. - Know petals attract pollinators to the plant. - Know plants need air, light, water, nutrients, and room to grow but the amount varies from plant to plant. - Know the stamen is the male part of the flower and the carpel is the female part. - Know when pollen from the stamen meets the carpel, fertilisation occurs and this is when new seeds begin to form. - Fertilisation is the part of the reproductive process when the male and the female cells fuse together. - Know seeds can be dispersed by the wind, being eaten, water, exploding or getting caught on passing animals. - Know that a variable is something that changes or can be changed within an investigation. - Know that the independent variable is the one that is changed by the scientist because this is the one they are testing. - Know that control variables are the things scientists keep the same to make sure that tests are fair. - Know to hold a ruler vertically (90° to the soil) when measuring the height of a plant and not against the stem because this might not be straight and you would end up measuring the length of the stem instead. - Know scientific investigations can lead to discoveries that change the way we live, e.g. George Washington Carver used science to improve farming in America. Originally a slave, Carver was ahead of his time taught about crop rotation to improve soil fertility because different plants use up different nutrients from the soil. He also used organic fertiliser to put nutrients back into the soil. This helped farmers produce more crops. He challenged his students to find answers to their questions through trial and error using the scientific method.	**Autumn 1 Plants** <u>Identifying and classifying</u> - Group different seed pods / fruit, using real life examples where possible or photographs, by using observations to suggest which type of seed dispersal they think the plant uses. <u>Observation</u> - Describe verbally in detail what they see (colour, size, shape, texture / feel of plant, soil, any visible roots etc) - Identify why a plant might be dying and what it might need to survive. - Draw detailed diagrams from cut flowers with the different parts involved in pollination labelled clearly. - Communicate clearly their understanding of the pollination process. <u>Fair and comparative testing</u> - Plan, in groups, investigations to test their ideas about what a plant needs. - Identify what the variables are when given a mature plant, grown from a bulb, and decide how to deprive it of one of the requirements. - Compare results to a control plant. - Make systematic observations of the plants appearance; take measurements of height / length and record in tables. - Draw conclusions by comparing their plant with the control and with those of the other groups. -Rank healthiest to least to identify which requirements are most important. - Ask relevant questions. - Use a carnation to demonstrate that the stem transports water to other parts of the plant. -Discuss what might make the water be transported more or less quickly? (external temperature, type of flower etc). -Form own questions to investigate, identifying the control and independent variables. <u>Research</u> - Find out the function of different parts of a plant using secondary sources and explain this verbally to others.. - Explain why and how plants' needs vary (cactus). - Find out about the life cycle of flowering plants and communicate findings using diagrams, scientific vocabulary and explanations. - Find out about different types of seed dispersal and communicate findings using diagrams, scientific vocabulary and explanations.	nutrients, seed dispersal, nectar, pollen, pollinators, pollination, fertilisation, seed formation, stamen, carpel, sepal systematic, conclusion, variable, fair test	How to grow bulb plants indoors https://www.pennington.com/all-products/fertilizer/resources/forcing-beautiful-bulbs-for-your-indoor-garden carnations, celery, tulips, daffodil, chrysanthemums work best with food colouring (2-3 hours). Woody stems take several days Plant song https://www.youtube.com/watch?v=ql6OL7_qFgU https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ-x8 activities NPP-plants posters / books, , propagation kits in the science cupboard, seeds and compost in shed, Kitchen garden, flower beds, orchard Birmingham botanical gardens trip Local walk to identify where plants are found growing

Y3 Spring	**Spring 1 Forces and Magnets** - Know some forces need contact between two objects, but magnetic forces can act at a distance. - Know forces can make objects move, speed up, slow down and stop. These include pushes, pulls and friction. - Know friction is a force that holds back the movement of an object. - Know friction acts in the opposite direction to the movement of the object. - Know magnets have two poles called north and south. - Know opposite poles attract each other and the same poles repel each other. - Know magnetic materials are always made of metal, but not all metals are magnetic. - Know iron is a magnetic metal. - Know magnets can be described as bar, round or horseshoe. - Know that a variable is something that changes or can be changed within an investigation. - Know that the independent variable is the one that is changed by the scientist because this is the one they are testing. - Know that control variables are the things scientists keep the same to make sure that tests are fair. - Know which buttons on a stop watch are used to clear, start and stop the timer. - Know which numbers on a stop watch represent the seconds and minutes. - Know that a tape measure must be place flat and the 0 lined up with the start. - Know to find the average measurement you must find the total and then divide this by the number of measure taken. - Know that bar charts need a title, axes labels, bars of equal width and spacing, equal increments on the Y-axis, 0 is placed where the X & Y axis meet. - Know people's understanding of magnets has changed over time. At first people thought some stones were alive because they made other materials move. Some people used magnetic materials to make compasses. Later, people identified that only certain stones were magnetic and it wasn't because they were alive and also the Earth has a magnetic field which is how compasses work. More recently, people used electricity to create electric magnets. **Spring 2 Light** - Know light is needed to see things and that dark is the absence of light - Know light can be reflected from surfaces - Know examples of light sources include: sun, star, torch, fire - Know examples of light being reflected of a surface include the moon, reflection in a mirror, water and high visibility jacket. - Know light from the sun can be dangerous because it can cause skin cancer, sun burn and damage the eyes. - Know sunglasses can protect eyes and sun cream can protect the skin. - Know shadows are formed when the light from a light source is blocked by an opaque object - Know the closer an object is to the light source, the larger the shadow it casts. - Know how scientific discoveries have changed the way we live, e.g. Use of natural sources, then fire, candles, oil lamps, invention of the light bulb…then compact fluorescent lights…then LEDs….solar lights	**Spring 1 Forces and Magnets** <u>Identifying and classifying</u> - Group together materials that are attracted by magnets and those that aren't. - Group objects/activities into contact and non-contact forces. <u>Observation</u> - Describe what they notice about how magnets interact with each other and objects -Identify that magnetism works through materials and does not need contact with the magnetic object to effect it. - Explore how magnets interact with each other including poles attracting and repelling each other. <u>Fair and comparative testing</u> - Plan, in groups, investigations to test how objects will move on different surfaces. - Identify what the variables are and how to keep the test fair. Decide what they will measure (time or distance). - Take systematic measurements by repeating tests and record in tables. - Communicate results in a bar chart. - Draw conclusions by comparing the different materials. Rank fastest/furthest to least and use observational details / knowledge of friction to explain the findings. - Investigate the strength of different magnets. <u>Research</u> - Find out how has our understanding of magnets changed over time **Spring 2 Light** <u>Research</u> - Find out how sources of light have changed over time and why. <u>Observation</u> - Explore the need for light to see objects using light boxes. - Draw conclusions based on light box observations about links between amount of light, shape, colour and details seen. - Explore the reflectiveness of materials using a torch. - Draw conclusions by making links between material qualities and reflectiveness. - Explore the shadows made by different objects. - Draw conclusion by making links between the objects and the shadow made. - Explore the shadows made on the playground at different times of the day. -Draw conclusions by communicating observations clearly and explaining the reasons behind them. <u>Identify and classify</u> - Group materials that are transparent, translucent or opaque. - Communicate their understanding of the words transparent, translucent and opaque. <u>Comparative and fair testing</u> - Plan how to investigate which materials make the best sunglasses. - Record observations and draw conclusions using scientific vocabulary to communicate clearly and accurately. - Investigate how moving the light source effects the shadow. (0 cm would be directly above it). - Record and communicate results by measuring the length of the shadow and creating a bar chart. - Draw conclusions by making a general statement that links the distance of the light source and the length of shadow.	Force, push, pull, friction, magnet, magnetic, attract, repel, magnetic poles, North, South, iron, nickel, cobalt systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test light source , reflect, opaque, transparent, translucent, surface, natural, shadow, blocked, solid, artificial, shiny, matt, systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	Slide 18 of ASE Y3 work samples provides a carousel of activities to address non-contact misconception Slide 21 of ASE Y3 work samples shows how to test magnet strength History of magnets https://www.magnet-shop.com/magnets-throughout-the-history Electric lights https://www.starenergypartners.com/blog/electricity-company/the-history-of-the-light-bulb/ https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ-x3 activities for magnets and 3 for light posters / books, variety of magnets and samples of metal in the science cupboard, Visitor- Fizz Pop Science Workshops & Shows https://hands-on-science.co.uk/workshops/ Slide 10-13 of ASE Y3 work samples give details of the need for light to see activities

Y3 Summer	**Summer 1 Rocks** - Know there are 3 types of rock: sedimentary, igneous & metamorphic. - Know igneous rock is formed when molten rock has cooled. It contains crystals, e.g. granite. - Know sedimentary rock is formed over time as layers of sediment build up in river and sea beds and are compressed into rocks. It contains grains. e.g. chalk. - Know metamorphic rock is formed when the structure of the rock has been changed due to intense pressure (squashing) and heat. e.g. marble. - Know soils are made from rocks and organic matter. - Know fossils are formed when a plant or animal dies in a watery environment and is buried in mud and silt. - Know that a magnifying glass can be used to see more details of an object. - Know to get the best view of a subject using a magnifying glass, hold the lens as close to the eye as possible and bring the object up in front of the lens until it is in focus. - Know that Mary Anning's work helps us to understand prehistoric life. Her discoveries of several dinosaur specimens, that assisted in the early development of palaeontology, were not given the credit they deserved at the time because women scientists were very rarely accepted. Today the Natural History Museum in London showcases several of Mary Anning's spectacular finds. Mary's legacy lives on along the rugged Jurassic Coast - now a UNESCO World Heritage Site.	**Summer 1 Rocks** <u>Identifying and classifying</u> - Categorise rocks. Walk around school / local area /church etc (rock detectives) to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties (powdery, smooth, rough, dusty, layered etc)- grow vocabulary for describing rocks. - Use a magnifying glass and observations to categorise rocks. Use rock samples to name the three types of rock and classify them based on the key properties of each. - Categorise rocks. Use images of weathering on old grave stones, monuments etc, work surfaces from kitchens, chalk and other real life examples of rock being used. Children use knowledge of rocks to explain how they categorised the images. - Classify a range of soil samples in a variety of ways, colour, crumbliness etc. <u>Research</u> - Find out how different rocks are made, their main properties and features and how they are used. - Find out about the different kinds of living things whose fossils are found in sedimentary rock and explore how fossils are formed. - Communicate their learning about fossils using scientific language. <u>Pattern finding</u> - Use maps to see if there a pattern in where we find volcanos on planet Earth? (geography link- will need to know what tectonic plates are) <u>Comparative and fair testing</u> - Predict if changing the soil type will effect plant growth by giving reasons linked to their knowledge of soils and plants. Children are presented with different types of soil (clay, chalk, sandy, peat, loam, and were then asked to think how the different soils might affect plant growth, e.g. links to nutrient content, how well roots can anchor in… - Plan, in groups, investigations to test their ideas about using different soil types. Identify what the variables are. Each group is given the same type of seeds to grow and decide how to make their test fair. - Investigate how porous and how hard the rocks are by dripping water on different types and rubbing them against sandpaper.	Appearance, physical properties, hard/soft, shiny/dull, smooth/rough, absorbent/non-absorbent, fossils, silt, soil, organic matter, sedimentary, igneous, metamorphic, hardness, grains, crystals, porous, lustre, sediment, chalk, marble, granite, systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	Slide 10-13 of ASE Y3 work samples give details of a fossil formation activity using dog biscuits. Mary Anning links https://www.bbc.co.uk/teach/class-clips-video/science-ks2-the-work-of-mary-anning/z7wvjhv https://www.nhm.ac.uk/discover/mary-anning-unsung-hero.html https://www.bbc.co.uk/bitesize/topics/zd8fv9q/articles/zf6vb82#:~:text=During%20her%20life%20Mary%20made,many%20other%20ancient%20sea%20creatures.&text=However%2C%20Mary%20documented%20her%20findings,understand%20the%20creatures%20she%20found.

	Summer 2 Animals including Humans - Know plants make their own food but animals cannot. - Know animals, including humans, need the right types and amounts of nutrition to grow, be strong and be healthy. This is known as a balanced diet. - Know nutrients are substances found in food that help keep the body healthy. - Know the names of the different food groups needed by humans include carbohydrates, protein, fats, sugars, dairy, fruit & vegetables - Know some of the jobs nutrients do: carbohydrates (starchy) provide slow releasing energy, sugars provide quick releasing energy, proteins help build and repair the body, fats provide energy and help build up your body, fibre helps you digest your food, vitamins and minerals build healthy cells, water is vital in making our body work properly. - Know humans and animals with internal skeletons are called vertebrates. - Know skeletons protect organs, support body shape and allow movement. - Know the names and positions of the following bones: skull, ribcage, pelvis - Know the human skeleton has different joints that move in different ways, including: ball & socket joint, hinge joint, gliding joint, - Know muscles work with bones, by contracting and lengthening, to create movement - Know how knowledge about the human skeleton was discovered and how it changed over time. E.g. Galen (Greek physician from 200CE) used to dissect apes and pigs. During a period known as the Renaissance (13-1600s), artists & scientists began to dissect the human body (not allowed before this time), correcting some of Galen's misconceptions, e.g. jaw is 1 bone. With the invention of x-rays and bone scan, people discovered that a baby's body has about 300 bones at birth. These eventually fuse (grow together) to form the 206 bones that adults have.	**Summer 2 Animals including Humans** <u>Research</u> - Find out about different types of nutrients: carbohydrates, proteins, fats, fibre, minerals and vitamins. Identify what they do to help the body and which foods they are found in. - Create balanced meals with annotations to demonstrate their understanding of human's need for the right amounts and types of nutrients. - Find out about the nutritional value of foods. Discuss why some salads have higher fat contents than some burgers, e.g. dressings. - Find out how many bones are in the human body and what the names for some of them are. - Communicate the role of the human skeletal system. <u>Identify and classify</u> - Give reasons for which food out of a groups of 3 or 4 is the odd one out using their knowledge of food groups and nutrients. - Compare and order foods on their nutritional value (e.g. salt, fat or sugar content) by looking at the column that displays content per 100gon food labels. - Name the food groups and nutrients found in different types of pizzas. - Identify the odd one out from a groups of animals using their knowledge of skeletal systems. <u>Observation</u> - Explore and communicate the different ways in which different joints within their own body move, e.g. moves in one directions, rotates, many directions, side to side. - Explore and communicate the ways muscles and bones work together to create movements by using videos clips and models.	nutrition, balanced diet, carbohydrates, protein, dairy, fats, fibre, vitamins, minerals, skeleton, vertebrate, invertebrate, contract, relax, muscles, skull, rig-cage, pelvis, ball & socket joint, hinge joint, gliding joint, systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	**Use real animals or photos not clip art** STEM- incredible ingredients activity https://www.stem.org.uk/resources/elibrary/resource/133743/incredible-ingredients https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x4 activities posters / books, models of human anatomy in the science cupboard, Links to how science knowledge about the human skeleton has changed: https://web.stanford.edu/class/history13/earlysciencelab/body/skeletonpages/skeleton.html https://en.wikipedia.org/wiki/Galen https://www.bbc.com/future/article/20190610-how-modern-life-is-transforming-the-human-skeleton LBQ- x3 activities NPP- rocks

Y4 autumn	**Autumn 1- sound** - Know sounds are made when something vibrates. - Know vibrations from sounds travel through a medium / substance to the ear. - Know the bigger the vibration the greater the volume. - Know the faster the vibration the higher the pitch. - Know sounds get fainter as the distance from the sound source increases. - Know blocking sound is known as insulating against sound. - Know that sound is measured in decibels. - Know that a trundle wheel can measure distances longer than a tape measure .and that the arrow should be aligned with the 0 to start. - Know repeating tests increases the reliability of the results because any odd results can be more easily spotted. - Know to find the average measurement you must find the total and then divide this by the number of measure taken. - Know that bar charts need a title, axes labels, bars of equal width and spacing, equal increments on the Y-axis, 0 is placed where the X & Y axis meet. - Know which buttons to press on a data logger to measure the sound, - Know that as the understanding of loud sounds damaging hearing increased, this led to changes in safety. **Autumn 2- Electricity** - Know the names of common appliances that run on electricity (mains and battery)/ - Know the parts of a circuit are called cells (battery), wires, bulbs, switches and buzzers. - Know an electrical circuit consists of a cell or battery connected to a component using wires. - Know a circuit is a pathway that electricity can flow around. - Know electricity can only flow around a complete circuit that has no gaps or loose connections. - Know a switch can open and close a circuit - Know an insulator is a material that does not allow electricity to flow through it, such as wood, glass and plastic. - Know a conductor is a material that does allow electricity to flow through it, such as copper, silver, gold. - Know how our understanding of electricity and how it is used has changed over time. The word electricity was first used in 1600 to describe natural phenomenon. Scientists changed their minds that electricity was static and realised it flowed. The first battery was created more than 200 years ago, followed by the electric motor. Electrical items such as light bulbs and washing machines started arriving in British homes in the 1930s. in 1975 the first mobile phones and digital cameras become available but I-phones were not around until 2007.	**Autumn 1- sound** Observations - Make sounds and see and/or feel the vibrations and link these to the sound produced. - Communicate what they find out using scientific vocabulary. Pattern seeking - Find patterns between the pitch of a sound and features of the object that produced it, e.g. length, width, size. - Find patterns between the volume of a sound and the strength of the vibrations that produced it. - Communicate clearly using scientific vocabulary and knowledge, how to change the volume and pitch of the sound produced when plucking a guitar string. Comparative and fair testing - Find out whether sounds could travel through solids, liquids and gases. Compare sound travelling through different medium vs the same sound travelling through air. -Record results by grading the loudness of the sounds they hear 0-5. - Find out how best to insulate a room against sound, testing different materials or changing the number of layers of one material. -Use a data logger to measure the sound. - Find out how distance from the sound source effects the volume using data loggers. - Use a calculator to calculate the average from several readings to increase reliability. - Communicate the results using graphs and charts. - Draw conclusions (for the investigations above) using their results to communicate what they have discovered and begin to clearly explain why this is using their scientific knowledge and vocabulary. **Autumn 2- Electricity** Identify and classify - Sort and group everyday appliances (electrical and non, use of batteries, rechargeable batteries, plug in devices etc). - Sort circuit diagrams into those that will work and those that won't. - Solve the problem of how to make the bulb light up using a battery but no wires. Choose from a range of materials, paper clips, tin foil, string etc. Observation - Explore how electrical components work (bulb, bulb holder, wires, battery and a battery holder). -Create a circuit to make the bulb light. -Draw a diagram for a complete circuit using simple representations. - Construct a simple circuit and add in home made switches. -Communicate clearly using scientific language and knowledge the purpose of the switch and how it works. Comparative and fair testing - Find our which materials are electrical conductors. - Draw conclusions by using scientific knowledge and vocabulary to communicate what they found out. - Explain why wires have a plastic cover with copper inside.	Sound source, louder, quieter, higher, lower volume, pitch, insulate, fainter, systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test Electricity, appliances, mains, battery, component, crocodile clip, cell, wire, bulb, buzzer, insulators, conductors, switch, motor, flow, loose connection, positive, negative, complete circuit systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	Loud sounds and safety links https://www.ogdentrust.com/assets/general/till-roll-timeline_The-loudest-sounds-ever-heard.pdf https://www.safeopedia.com/advances-in-hearing-protection-tech/2/7590 seeing sound vibrations demonstration https://www.ogdentrust.com/resources/phizzi-practical-seeing-sound-vibrations https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x3 activities posters / books, , tuning forks and other sound making equipment in the science cupboard, data loggers (in switch room) Visitor- Fizz Pop Science Workshops & Shows Electrical inventions timeline activity https://www.ogdentrust.com/assets/general/scientific-ideas-over-time_electricity_till-roll-timeline.pdf LBQ x2 activities NPP- electricity

Y4 spring	**Spring 1- states of matter** - Know materials can be one of three states: solids, liquids or gases. - Know solids are materials that keep their shape unless a force is applied to them. They do not change the amount of space they take up. They can be hard, soft or even squashy. - Know liquids take the shape of their container. They can change shape but do not change the amount of space they take up. They can flow or be poured. - Know gases can spread out to completely fill the container or room they are in. They do not have any fixed shape. - Know when a solid is heated to its melting point, it melts and changes to a liquid. - Know when a liquid is cooled to a low enough temperature, it freezes and the liquid becomes a solid. - Know water vapour is water that takes the form of a gas. - Know when a liquid is heated, it turns into a gas. This is called evaporation. - Know when a gas is cooled, it turn into a liquid. This is called condensing. - Know that a variable is something that changes or can be changed within an investigation. - Know that the independent variable is the one that is changed by the scientist because this is the one they are testing. - Know that control variables are the things scientists keep the same to make sure that tests are fair. - Know that the way we measure temperature has changed over time: At first, Thermoscopes with no scales on were used (uses expansion of air) Next the use of boiling and freezing water as a constant was used to and thermometers which used scales were invented. This was standardised by Fahrenheit and Celsius so that everyone was using the same scales and could compare temperatures. Today, there are, infra-red thermometers.	**Spring 1- states of matter** <u>Observation</u> - Describe what happens when you place currents into lemonade using the words solid, liquid & gas. Create a diagram. - Identify if 'can be poured' is a property of just liquids. -Explain how solids and gases can be poured. -Communicate through diagrams and annotations the properties of 'foam burst' shower gel. -Communicate their understanding of condensation based on demonstrations, pictures and concept cartoons seen. <u>Identify and classify</u> - Sort statements of properties into solid, liquid or gas. Use a 3-circled Venn diagram to demonstrate when properties were true for more than one state. - Identify if a substance is a solid, liquid or gas by describing the properties that have been noticed as justification. E.g. Rice, flour, toothpaste, air freshener, sand, milk etc. - Communicate their understanding of solids, liquids and gases in written form. <u>Comparative and fair testing</u> - Predict which type of chocolate button will melt quickest. - Plan an investigation to find the answer. - Make systematic and careful observations. - Draw conclusions by referring to observations made. Consider how they would adapt their investigation method to improve it for next time. - Investigate what effects evaporation rates. Use the scenario of socks not drying fully as a real world problem to solve. - Plan an investigation to find the answer, considering which variable to change / keep the same / measure. - Draw conclusions by referring to observations made and using their knowledge of evaporation to explain these. Consider how they would adapt their investigation method to improve it for next time. <u>Research</u> - Find out how the melting temperatures differ between materials and the significance of this, e.g the purposes they are used for. - Find out about the role of evaporation and condensation within the water cycle. -Communicate their understanding using scientific vocabulary accurately.	states of matter, solid, solidify, particle, melt, freeze, liquid, evaporate, condense, gas, degrees Celsius °C, thermometer, water cycle, evaporation, condensation, temperature, water vapour, precipitation, ground water systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	Pouring gas demonstration / instructions https://www.youtube.com/watch?v=rPfZg_xh72A Slide 13 of ASE Y4 work samples give details of which 7 liquids to freeze when investigating melting points. Slide 16-17 of ASE Y4 work samples give details of evaporation test. Information on the history of measuring temperature https://www.youtube.com/watch?v=rARnTlPax8E temperature strips & infra-red thermometer (school medical equipment) Ella Webb has a Thermoscope to borrow.

	Spring 2- Animals including humans - Know digestion is the process where food is broken down so it can be used by the body. - Know the parts of the body involved in digestion include: mouth, salivary glands, tongue, teeth, oesophagus, stomach, small and large intestine. - Know that salivary glands produce saliva to help you chew, taste and swallow food. - Know that the tongue helps to mix the food and saliva. - Know that muscles in the oesophagus move the food down from the mouth to the stomach. - Know that enzymes and muscles in the stomach mix and break down food. - Know the small intestine absorbs nutrients from food. Know the large intestine absorbs water from waste food and forms stools. - Know the different types of teeth are incisors for slicing, canines for tearing, premolars for holding & crushing and molars for grinding food into smaller pieces. - Know that dental treatment has changed over time as new scientific knowledge has been gained. - Know a food-chain is a diagram that shows how energy is passed between living this and that the arrow show what the energy is being passed onto. - Know that all life on Earth gets its energy from the Sun and this is why this comes at the start of a food chain. - Know plants are called producers because they produce their own food by using the Sun's energy and they come second on a food chain diagram. - Know that herbivores and omnivores eat plants to get energy from them. - Know omnivores and carnivores eat other animals to get energy from them and that the animal that is eaten is known as the 'prey' and the animal who ate the other creature is known as the 'predator'.	**Spring 2- Animals including humans** <u>Research</u> - Identify and order the parts of the body involved in the digestive system. Communicate this information using diagrams and annotations. - Ask relevant scientific questions linked to the topic of digestion, e.g. How does food avoid going into our lungs when we eat? Why do we fart? - Find out about the function of the different organs involved in the digestive system. - Communicate verbally and using models, the digestive process for humans e.g. create a science video using household equipment to describe the different functions of the organs involved. - Communicate, in written form, findings about how the digestive system works, e.g. describe the journey and experiences of a piece of apple as it travels through he body. - Use mirrors to count and identify the types of teeth they have in their mouth. -Eat a piece of apple and identify where in the mouth the biting and chewing took place. - Identify the function of different types of teeth. - Find out what damages teeth and how to look after them. - Find out about what different creatures eat within a variety of habitats and construct and interpret a variety of food chains, identifying producers, predators and prey **Observations** - Find out how an egg shell changes when it is left in cola, milk, vinegar, water etc over a period of time. - Record observations after 1 day and 1 week. - Draw conclusions by stating what the significance of the findings means for looking after our teeth.	oesophagus, salivary gland, chew, grind, tear, slice, teeth, canine, incisor, molar, pre molar, milk teeth, oral hygiene, cavity, enamel, nerve, dentine, root, gums, calcium, fluoride, stomach, small intestine, large intestine, liver, pancreas, rectum, colon, anus, energy, producer, predator, prey systematic, data logger, conclusion, evidence, secondary source, interpret, classification key, variable, fair test	Dental treatments https://www.clickliverpool.com/features/31247-how-has-dentistry-transformed-through-the-years/ (modern developments) https://www.thelist.com/58976/dentist-recommendations-changed-time/ (historic treatments) https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x6 activities NPP-changes in state posters / books, containers in the science cupboard, hotplates / cooking room

Y4 summer	**Summer 2- Living things and their habitats** - Know animals can be grouped into 2 main groups: Vertebrates, those with a backbone and invertebrates, those that do not have a backbone. - Know vertebrates can be classified under 5 main headings and know the key features of each category: fish, bird, mammal, reptile, amphibian. - Know plants can be grouped into those that produce seeds (flowering plants and conifers) and those that don't (ferns and mosses). - Know earthquakes, storms, floods, droughts, wildfires & the seasons are natural events that can change an environment. - Know deforestation, pollution, urbanisation, the introduction of new animal or plant species & creating new nature reserves are man-made events that can change the environment. - Know that scientists such as Jane Goodall learnt about the habits and behaviours of animals (chimpanzees) by observing them closely over a long period of time. The information she gathered helped inform zoos, governments and the public about how they could best look after and protect them. - Know that scientific investigations were used to identify ways to control the pests that dan=mage crops. They were also used to discover that some of these methods were harmful to humans and the environment and for that reason some chemicals that were used in the past are now banned.	<u>Identify and classify</u> - Identify the odd one out from a group of animals / plants based on its features. -Describe the shape, edges and arrangement of leaves on a plant to help identify it. - Use Venn diagrams to sort living things (including leaves & plants) - Use classification keys to identify living things, including plants. - Create a classification key for plants in the local environment, to identify living things. <u>Pattern seeking</u> - Find out if certain living things are found in certain places. E.g. Where do you usually find woodlice / daisies? - Explain why this is based on habitat knowledge. <u>Research</u> -Find out how living things, including plants, can be positively and negatively affected by human and natural events. -Draw conclusions by communicating the cause of a problem, the impact and the possible solutions.	vertebrate, invertebrate, , environment, conifer, non-flowering, moss, fern, amphibian, reptile, bird, broad leaf, needle, stalk, blade, vein, alternate leaf arrangement, opposite leaf arrangement, whorl leaf arrangement, mammal, human impact, urbanisation, deforestation, population, extinct, drought, migrate, hibernate systematic, data logger, conclusion, evidence, secondary source, interpret, classification key,	plant classification video https://www.youtube.com/watch?v=cgVlrtGnG6s leaf vocab for shapes https://kids.britannica.com/kids/article/leaf/433080 leaf structure https://www.youtube.com/watch?v=eE6TFq1oHeM Jane Goodall links https://www.ducksters.com/biography/scientists/jane_goodall.php https://www.twinkl.co.uk/resource/tp2-s-238-planit-science-year-5-living-things-and-their-habitats-lesson-4-jane-goodall-lesson-pack deforestation https://www.theclassroom.com/fertile-crescent-major-means-migration-ancient-times-5282.html Plastic pollution https://www.sciencehistory.org/the-history-and-future-of-plastics Pest control https://ameritechpest.com/the-history-of-pest-control.html for clarifications https://learning.rzss.org.uk/mod/page/view.php?id=967&forceview=1 Vocabulary and terminology resources https://www.twinkl.co.uk/resource/science-knowledge-organiser-living-things-year-4-t-sc-2549801 https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x6 activities posters / books, , variety of insects, arachnids in glass cases in the science cupboard,

Y5 autumn	**Autumn 1- Forces** - Know a force causes an object to start moving, stop moving, speed up, slow down or change direction. - Know gravity is a non-contact force that pulls everything toward the Earth, causing unsupported objects to fall. - Know air resistance, water resistance and friction are contact forces that act between moving surfaces. - Know pulleys, levers and gears are all mechanisms that allows a small force to have a greater effect. - Know a lever can be used to make lifting heavy items easier by moving the pivot point closer to the object. - Know gears are toothed wheels that lock together and are used to change the speed or direction of movement. - Know pulleys are wheels joined by a belt and can be used to change the speed, direction or force of a movement - Know Physics is the study of the relationship of objects, forces, and energy - Know that the independent variable is the one that is changed by the scientist because this is the one they are testing. - Know that control variables are the things scientists keep the same to make sure that tests are fair. - Know that the dependent variable is the one that will be observed / measured. - Know which buttons on a stop watch are used to clear, start and stop the timer. - Know which numbers on a stop watch represent the seconds and minutes. - Know that mass is measured in Kg and weight is the downward force on an object and is measured in Newtons. A 1kg mass has a 10N force acting on it on Earth. - Know that when hooking objects onto a force meter in the vertical position, they are measuring the force of gravity on an object. - Know that when hooking objects onto a force meter in the horizontal position and dragging them, it is measuring the force needed to overcome friction. - Know that Sir Isaac Newton studied the work of other famous scientists: Aristotle, Galileo and Kepler to help develop his own knowledge. He then used observations, such as an apple falling, to create theories and tested these out with experiments and inventions. He contributed many theories about forces. **Autumn 2- Earth and Space** - Know our solar system includes The Earth, and 7 other planets that all orbit the Sun. - Know it takes the Earth 1 year (365 ¼ days) to orbit the sun. - Know the Earth spins on its own axis. One rotation takes 1 day (24 hours) - Know the Moon orbits the Earth. It takes approximately 28 days to complete its orbit. - Know the Sun, Earth and Moon are approximately spherical bodies. - Know it is daylight in the part of the world that the sun is shining on and night time in that part of the world in shadow. - Know Physics is the study of the relationship of objects, forces, and energy - Know that scientists changed from believing the Earth was at the centre of the solar system to the sun being at the centre as new evidence became available. New inventions such as telescopes helped to identify more planets.	**Autumn 1- Forces** <u>Observation</u> -Explore images of moving objects and forces in actions. Find connections and differences to draw out prior knowledge of forces. -Explore images of low friction, e.g. a polar bear sliding across snow on its back. Consider what a world without friction would be like. -Identify which parachutes are more effective. -Draw conclusions by explaining why certain parachutes take longer to reach the ground. -Use their knowledge of air resistance to do this. -Explore the interaction of gears and levers. Communicate their findings through annotated diagrams. <u>Research</u> -Find out about the pros and cons of gravity (include own thoughts based on life experiences & knowledge as well as internet information). <u>Pattern seeking</u> -Find out if there is a connection between the mass and the weight of an object. -Measure the weight of objects (placed in Polly pockets) using force meters and the mass using scales. -Draw conclusions by explaining the link between mass and weight using the results and scientific knowledge they have. <u>Comparative and fair testing</u> - Plan an investigation to find out which surface has the highest levels of friction. -Measure the force acting on an object using a force meter (draw a shoe across different surfaces using the force meter). -Communicate findings using charts. -Draw conclusions by explaining the link between the results, friction and scientific knowledge they have on forces. -Identify the control, independent and dependent variables. -Form questions linked to air resistance. -Plan an investigation to answer their own questions. -Identify the control, independent and dependent variables. -Find out how changing the pivot point effects the amount of effort needed to lift the load using levers. Communicate findings using charts. -Draw conclusions by explaining the link between the results, friction and scientific knowledge they have on forces. <u>Identifying and classifying</u> -Group images based on whether or not the object demonstrates high or low levels of air resistance. -Communicate the effects of air resistance on each object and if this changes as different stages (e.g. a man jumping from a plane with a parachute on). -Group objects based on the type of mechanisms they use (pulley, gear, lever). **Autumn 2- Earth and Space** <u>Research</u> -Find out what objects make up our solar system and their movements. -Find out about the movements of the Earth and sun. Explain how these movements lead to night and day on Earth. -Find out how theories about how the solar system was arranged changed over time. <u>Observation</u> -Describe how shadows change throughout the day, making links with movement of the earth. -Record measurements in charts and graphs. -Explain how the Earth's rotation effects our view of the sun and shadows on Earth.	gravity, air resistance, water resistance, accelerate, decelerate, , mechanism, simple machines, pulley, gear, lever, pivot point, load, effort Galileo Galilei, Isaac Newton repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, chemistry, biology, physics Solar system, satellite, moon, rotate, tilt, orbit, axis, hemisphere, phases of the moon, eclipse, spherical, Geocentric, Heliocentric Planets, Telescope, Ellipse, Orbit reliability, degree of trust, scatter graphs, line graphs, casual relationships, refute ideas, secondary sources, theory, chemistry, biology, physics	Forces video clips http://www.bbc.co.uk/learningzone/clips/forces-in-action-no-narration/1601.html https://www.bbc.co.uk/bitesize/clips/zp4g9j6 <u>Newton info card</u> https://www.ogdentrust.com/assets/general/Research-cards_gravity_forces.pdf https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com https://pstt.org.uk/resources , LBQ- x3 activities posters / books, , plasticine and measuring tubes, friction ramps in the science cupboard, Visit- Space museum in Leicester or Visitor- Fizz Pop Science Workshops & Shops https://hands-on-science.co.uk/workshops/ working scientifically workshop or revision of previously taught unit or enrichment workshop choice (whole school science day activity linked Solar system research cards https://www.ogdentrust.com/assets/general/research-card-Earth-and-space.pdf https://www.ogdentrust.com/assets/general/History-of-the-solar-system_lesson-plan.pdf

Y5 Spring	**Spring 2 - Properties and changes of materials** - Know materials have different uses depending on their properties and state (liquid, solid, gas). - Know properties include hardness, transparency, electrical and thermal conductivity and attraction to magnets. -Know the steps involved in constructing a chart, classification key, line graphs - Know dissolving is when a solid breaks down into pieces so small they cannot individually seen within a liquid. This mixture looks uniform throughout. - Know a solution is made when solid particles dissolve in a liquid. - Know materials that will dissolve are known as soluble. Materials that won't dissolve are known as insoluble. - Know a suspension is when the particles don't dissolve. - Know mixtures can be separated by filtering, sieving and evaporation. - Know salt dissolved in water, oil mixed with water, sand mixed with water and pebbles mixed with sand are examples of reversible changes. - Know burning paper, rusting, making toast, boiling an egg, mixing bicarbonate of soda and vinegar are examples of irreversible changes where new materials have been created because of a chemical change. * - Know that chemistry is the study of the properties of materials and substances and the interaction between them. - Know that the independent variable is the one that is changed by the scientist because this is the one they are testing. - Know that control variables are the things scientists keep the same to make sure that tests are fair. - Know that the dependent variable is the one that will be observed / measured. - Know which buttons on a stop watch are used to clear, start and stop the timer. - Know which numbers on a stop watch represent the seconds and minutes. - Know which buttons to press on the data logger to measure temperature and that a probe must be attached when measuring the temperature of liquids. - Know that temperature readings should not be recorded until the numbers have stopped changing. - Know that scientific discovery can be deliberate or accidental and change the way do things. E.g. Stephanie Kwolek invented Kevlar. Kevlar has gone on to save lives as a lightweight body armour for police and the military; to convey messages across the ocean as a protector of undersea optical-fibre cable; to suspend bridges with super-strong ropes; used for canoes, drumheads, and frying pans. However, Spencer Silver- accidentally invented the post it note- she was looking specifically for a super strong material.	**Spring 2 - Properties and changes of materials** <u>Observation</u> -Create diagrams with annotations to describe what can be seen when raisins are placed in a clear container of lemonade. -Describe and explain what happens when sugar is added to water. -Describe the new materials being created from demonstrations of effervescent tablets dissolving in water, toast being cooked, rust on nails etc. <u>Identify and classify</u> -Sort a range of objects into groups based on their properties using Carroll diagram, Venn diagrams with 2 or 3 circles, tables etc -Design a classification key to separate materials based on their properties e.g. is it flexible / magnetic / a solid/ does it conduct electricity etc <u>Comparative and fair testing</u> -Identify what variables might affect how quickly sugar dissolves in water and use this to create questions to investigate. -Plan a fair test by identifying the independent, control and dependent variables. -Present results in charts and graphs. -Interpret results by explaining what happened and why. Consider how they could make their results more reliable. *(complete twice- once testing the effect of temperature and once using sugar of different sizes: caster, granulated & cubes or the effect of stirring)* -Find out which mixtures can be separated by filtering (water and sand/salt/sugar). -Identify what variables might affect how quickly a salt solution evaporates and use this to create questions to investigate. -Predict what will happen by giving reasons based on scientific knowledge and previous experiences. -Plan how to separate a mixture of pasta shells, paper clips, chickpeas, lentils and salt. -Find out which materials make good substitutes for filter paper. -Find out how well different types of cups insulate warm drinks. -Record results in tables at regular intervals. -Present results in line graphs. <u>Research</u> -Find out what different household items are made from, e.g. saucepans & lids, thermal cups, plugs etc. Explain how the properties of the products help it function well and safely.	magnetic, electrical conductor / insulator properties, hardness, solubility, transparency, thermal conductor/insulator, rusting, new material, dissolve, solution, soluble, irreversible/ reversible changes, mixing, filtering, sieving, new material, burning, rusting, chemistry, repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, chemistry, biology, physics	Kevlar & post it note invention https://invention.si.edu/innovative-lives-stephanie-kwolek-and-kevlar-wonder-fiber https://www.sciencehistory.org/historical-profile/stephanie-l-kwolek https://www.3m.co.uk/3M/en_GB/post-it-notes/contact-us/about-us/ **Comparative test**- overtime: what effects the rate of rusting? https://www.youtube.com/watch?v=Rep1JKgcEr4 https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x8 activities posters / books, samples, beakers, pipettes, sieves, filter paper, candles in the science cupboard, hotplates, Sum 2: Visit to Polesworth high school for making glue/irreversible changes (need to change dates for 2020/21 * https://www.sciencebuddies.org/science-fair-projects/ask-an-expert/viewtopic.php?t=17141- note that reactions involving mentos and cola are not chemical reactions, but physical. They are however irreversible because the original form cannot be restored.

Y5 Summer	**Summer 1- Living things and their habitats** - Know the life cycle stages for a frog, robin, dragonfly, butterfly, snake and rat. - Know the similarities and differences between the life cycles of a frog, robin, dragonfly, butterfly, snake and rat. - Know metamorphosis is the sudden change in the structure of an animal's body and its behaviour. - Know the lifecycle of a strawberry plant and poppy. - Know gestation is the period of time taken for a baby animal to grow inside the female until it is born. - Know biology is the study of living things. - Know that David Attenborough is a biologist who has communicated his knowledge of plant and animal life through broadcasting. He has influenced a generation and raised awareness for conservation issues around the world. **Summer 2- Animals including humans** - Know the main stages of the human lifecycle are: prenatal, infancy, childhood, adolescence, early, mid and late adulthood. - Know the six stages of the human life cycle and what the general physical difference are between them (prenatal, infancy 0-2, childhood 3-10, adolescence 10-19, Early adulthood 19-39, middle adulthood 40-60, late adulthood 60+) - Know during puberty, the body prepares for adulthood by growing taller, changing shape, developing more body hair and producing more sweat. - Know everyone ages differently but cells don't regenerate as quickly in old age which effects how well organs work and how well people fight off illness. - Know biology is the study of living things. - Know that life expectancy has changed over time because of the development of scientific knowledge on health, illness and technology.	**Summer 1- Living things and their habitats** <u>Research</u> - Find out the key stages within the life cycles of a frog, robin, dragonfly, butterfly & rat. - Communicate findings by drawing the life cycle of a range of animals and add relevant annotations for key details. - Compare similarities and differences between the life cycles using Venn diagrams. - Find out the key stages within the life cycles of flowering and non flowing plants. -Explain the difference between sexual and asexual reproduction and give examples of how plants reproduce in both ways. <u>Pattern seeking</u> - Investigate if there is a link between the size of an animal and their gestation period. - Form further questions linked to learning from size / gestation investigation that could be investigated (e.g. links between gestation period and life span or habitat or animal group- mammal, fish etc) <u>Observation</u> - Describe the physical changes seen over time when strawberry and potato plants grow. - Describe the physical changes seen over time when meal worms grow into darkling beetles. **Summer 2- Animals including humans** - Communicate learning about the human life cycle and the key physical features at each stage.	pollination, fertilisation, seed formation, asexual reproduction, plantlets, runners, bulbs, cuttings, sexual reproduction, adolescent, gestation, larva(e), nymph, metamorphosis, cocoon, mate, life cycle, gestation, prenatal, foetus, infant, childhood, adolescent, , life expectancy, puberty, adulthood, regenerate.	David Attenborough https://en.wikipedia.org/wiki/David_Attenborough#Religious_views https://www.bbc.co.uk/teach/nine-astonishing-ways-david-attenborough-shaped-your-world/z4k2kmn https://www.greenelement.co.uk/blog/david-attenborough-effect/ Life expectancy https://www.kingsfund.org.uk/publications/whats-happening-life-expectancy-england https://www.sarahwoodbury.com/life-expectancy-in-the-middle-ages/ https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x9 activities posters / books, in the science cupboard, spider plants, succulent plants, kitchen garden, seeds, bulbs, compost, pots

Y6 Autumn	**Autumn 1- Evolution and inheritance** - Know all living things have offspring of the same kind because features in the offspring are inherited from the parents. - Know sexual reproduction leads to offspring that are not identical to their parents because they inherit a mixture of features from each parent. - Know plants and animals have characteristics that make them suited (adapted) to their environment. - Know if an environment changes rapidly, some variations of a species may not suit the new environment and will die. - Know if an environment changes slowly, animals and plants with variations that are best suited survive in greater numbers to reproduce and pass their characteristics on to their young. - Know evolution is the change in the characteristics of a species over several generations and relies on the process of natural selection - Know fossils give us evidence of what lived on the Earth millions of year ago and provide evidence to support the theory of evolution. -Know that a theory is a carefully thought-out explanation for observations of the natural world that has been constructed using the scientific method, and which brings together many facts and hypotheses. - Know the scientists Darwin and Alfred Wallace observed how living things adapt to different environments to become distinct varieties with their own characteristics. This challenged the beliefs of the day that all livings things were created by a god and remained the same. This evidence helped to for the theory of evolution. **Autumn 2- Electricity** - Know electricity flows. -Know adding more cells to a complete circuit will make a bulb brighter, a motor spin faster or a buzzer make a louder sound. If you use a battery with a higher voltage, the same thing happens. - Know adding more bulbs to a circuit will make each bulb less bright. Using more motors or buzzers, each motor will spin more slowly and each buzzer will be quieter. - Know turning a switch off (open) breaks a circuit so the circuit is not complete and electricity cannot flow. Any bulbs, motors or buzzers will then turn off as well. - Know the electrical symbols for; wire, lamp (on), lamp (off), switch (on), switch (off), buzzer, motor, cell, battery - To know how batteries have changed over time. E.g. The earliest use of batteries can be dated back to 250 BC known as the Baghdad Batter, however, there is disagreement over whether this really was a battery. The term battery was first used by Benjamin Franklin in 1749. The true battery that we are using today was invented by Alessandro Volta in 1800. The lead battery was invented in 1859 and are still used today to start combustion engine cars. They are the oldest example of a rechargeable battery. The batteries we have are a lot smaller than before. Now, scientists are exploring further capacities of batteries to store energy from solar and wind systems.	**Autumn 1- Evolution and inheritance** <u>Research</u> -Identify how particular animals and plants are suited to their environment by explaining how their features help them survive. -Communicate their findings in a variety of ways, e.g. ICT, flow charts, posters etc. -Identify the type of adaptations needed to survive in an unusual environment, e.g. ice. -Find out how the industrial revolution affected two varieties of peppered moths. -Communicate their findings using scientific language and explanations that draw of previous science knowledge. -Design a moth that would be camouflaged in a specified environment. -Use the Reebop model to understand the random but limited nature of inheritance. -Compare the characteristics of a modern day elephant to a Woolly mammoth. - Describe the theory of Charles Darwin and Alfred Wallace on evolution and what methods they used as evidence. -Discuss what evidence there is for evolution using examples learned in this unit and knowledge about Mary Anning recalled from Y3. <u>Comparative and fair testing</u> -Make predictions about what type of food a bird is best suited to eating based on the shape of their beak. -Create a table to record results in for the "Darwin's finches" investigation. -Draw conclusions by explaining how feeding effectiveness through adaptation is linked to survival of individual birds and future populations. <u>Observations</u> -Compare images of a family by identifying what features had been inherited by off-spring from their parents -Identify who horses have changed over time by looking at images of fossil remains. **Autumn 2- Electricity** <u>Observation</u> -Predict whether a circuit will light up a bulb based on a drawing of the circuit. -Give reasons for why a circuit won't work based on scientific knowledge from Y4. <u>Comparative and fair testing</u> -Plan investigations into finding out how increasing the number of cells or number of components, affects the brightness of a bulb or the loudness of a buzzer. -Use standard electrical symbols to draw circuits. -Use data loggers to take measurements of the light given out by the light bulbs / sound given out by a buzzer or motor -Draw conclusion by using evidence and scientific knowledge to explain how increasing cells / components affects the output. <u>Research</u> -Find out how batteries have changed over time.	Evolution, adaptation, inherited traits, adaptive traits, natural selection, inheritance, DNA, genes, variation, parent, off-spring, fossil, environment, habitat, fossilisation, Charles Darwin, Alfred Wallace reliability, degree of trust, casual relationships, refute ideas, secondary sources, theory, biology, physics Voltage, brightness, volume, series circuit, parallel circuit, power source , repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, biology, physics	Speak to foster carers or adopted parents for children who do not live with their biological family to identify at what stage they are at with their life story work. https://www.bbc.co.uk/teach/class-clips-video/science-ks2-the-work-of-charles-darwin-and-alfred-wallace/zrbxgwx intro to Darwin https://practicalbiology.org/genetics/modelling-inheritance/making-reebops-a-model-for-meiosis?highlight=WyJyZWVib3BzIiwibWFyc2htYWxsb3dzIiwidGhhdCIsInJlZWJvcHMgbWFyc2htYWxsb3dzIiwicmVlYm9wcyBtYXJzaG1hbGxvd3MgdGhhdCIsIm1hcnNobWFsbG93cyB0aGF0Ill0 Reebops activity Battery links https://www.dbmsolar.com/the-evolution-of-batteries/ https://en.wikipedia.org/wiki/Baghdad_Battery https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ-x3 activities posters / books, samples in the science cupboard, Visit- Polesworth High school: making fireworks (predictions, observations, safe use of equipment)

Y6 Spring	**Spring 1- Living things are their habitats** -Know that the first way in which living things are sorted is into micro-organisms, plants, fungi and animals. -Know fungi are different to plants because they do not make their own food, instead they decompose matter and feed off that. -Know a microorganism is an organism that can only be seen using a microscope and include viruses, bacteria and fungi.. -Know mini-beasts are invertebrates and can be categorised into 6 main groups: • insects (6 legs, 3 body parts, sometimes wings), • spiders (8 legs), • worms (long, soft body with many segments but no legs), • crustaceans (7 pairs of legs, exoskeleton), • centipedes & millipedes (many body segments & many legs), • slugs & snails (1 slimy foot, sometimes shell) -Know the steps involved in constructing a classification key. -Know that Carl Linneaus' created a classification system for living things that is still used today to help identify new species that are discovered. This is called taxonomy which comes from the Greek words taxon and taxa meaning one and group.	**Spring 1- Living things are their habitats** <u>Identify and classify</u> -Use a classification key to identify different types of leaves. -Create a classification key to sort different types of daffodils. -Give reasons based on observable characteristics and knowledge when identifying the odd one out within a group of plants. <u>Research</u> -Find out about the main characteristics of the four main plant groups and communicate their findings. -Find out about the main characteristics for animals within one of the vertebrate groups as well as some of the variation. -Use scientific vocabulary to communicate the key physical features and stages within the life cycle that help identify each of the 5 main vertebrate groups. -Find out about the main characteristics for each of the 6 main invertebrate groups.	Exoskeleton, vertebrate, invertebrate, insect, spider, worm, crustacean, centipede, millipede, slug, snail. characteristics, microorganisms, organism, Carl Linnaeus, Linnaean, segregated, vein, virus, bacteria, fungi, plankton repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, chemistry, biology, physics	Carl Linneaus info https://www.bbc.co.uk/teach/class-clips-video/science-ks2-the-work-of-carl-linnaeus/zhnjf4j https://www.famousscientists.org/carolus-linnaeus/ https://www.twinkl.co.uk/teaching-wiki/classification-of-plants Fungi note- they are not animals because they absorb nutrients from their environment instead of ingesting them like animals. Plankton note- these are microorganisms that live in the sea. They can be microscopic animals (zooplankton), plants (phytoplankton), fungi (Mycoplankton), bacteria (Bacterioplankton) and viruses (virioplankton) https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ- x3 activities posters / books, samples of arachnids, mini-beasts etc in glass blocks in the science cupboard,

Y6 Summer	**Summer 1- light** -Know light appears to travel in straight lines. -Know continuous lines are needed when drawing light in scientific diagrams. -Know we see objects when light is either produced by an object or light is reflected from an object and goes into our eyes. -Know objects that block light (are not fully transparent) will cause shadows. -Know because light travels in straight lines, the shape of the shadow will be the same as the outline shape of the object -Know the size of the shadow is larger when the light source and object move closer to each other as more of the light is blocked. -Know the steps involved in constructing a line graph -Know that the invention of the light bulb was a process, with contributions from several scientists, rather than a single event. **Summer 2- Animals including humans** -Know the heart, blood vessels (arteries, veins and capillaries) and blood make up the human circulatory system. -Know the heart is a muscle that pumps blood in the blood vessels around the body. -Know blood is pumped by the right side of the heart to the lungs to collect oxygen and then returns to the heart where the left side pumps it to the rest of the body. This is known as a double circulatory system because the heart does two jobs at the same time. -Know blood returns to the lungs and carbon dioxide is removed before it returns to the heart to start the cycle again. -Know nutrients, water and oxygen are transported in the blood to the muscles and other parts of the body where they are needed. As they are used they produce carbon dioxide and other waste products. -Know lifestyle includes what we eat, drink, activities we take part in, amount of sleep we get and the type of relationships we have with people. -Know diet, exercise, drugs and lifestyle have an impact on the way our bodies function. -Know the role Marie Maynard's discoveries played in improving the health advice given to people regarding how to look after their heart.	**Summer 1- light** <u>Comparative and fair testing</u> -Draw conclusions by making links between how light travels and the results of when a torch is shone through a bent and an unbent piece of pipe <u>Observation</u> -Use diagrams to communicate how light travels when it is reflected off mirrors or introduced into dark spaces in order for us to see. <u>Pattern seeking</u> -Create a results table for investigating how shadow size can be changed -Create a line graph to present the their results. -Draw conclusions by making general links between the size of the shadow compared to the distance between the light source and object and use results as the evidence to prove this. -Explain how moving an object closer/further from a light source changes the size by referring to knowledge of how light travels and using accurate scientific vocabulary. <u>Research</u> -Find out the different stages involved in the invention of the light bulb. **Summer 2- Animals including humans** <u>Research</u> -Find out about Mary Raynard's discoveries played and how these improved the health advice given to people regarding how to look after their heart. -Find out and explain the purpose of the circulatory system, what body parts are involved and their function. <u>Comparative and fair testing</u> -Draw conclusions about why different people's pulse rate is different after exercise by considering the reliability of the results collected and the impact of different life styles. <u>Observation</u> -Plan an investigation to find out how pulse rate changes over time after exercise. -Present results in line graphs. -Draw conclusions by using knowledge of the circulatory system to explain the results. <u>Pattern seeking</u> -Compare the pulse rate of different groups (e.g. girls/boys, those taller than 1.5m and those shorter than this etc) by identifying general trends and recognising potential anomalies that may affect the accuracy of results.	light source ,absence of light, reflect, opaque, transparent, translucent, surface, natural, artificial, shiny, matt, straight lines, light rays repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, physics Heart, pulse, rate, pumps, blood, blood vessels, transported, lungs, oxygen, carbon dioxide, nutrients, water, muscles, cycle, circulatory system, diet, exercise, drugs, lifestyle repeat readings, reliability, degree of trust, scatter graphs, line graph, casual relationships, refute ideas, secondary sources, theory, chemistry, biology,	https://www.bbc.co.uk/programmes/b00hxp2v/clips?page=1 https://www.bbc.co.uk/bitesize/subjects/z2pfb9q https://www.stem.org.uk/primary-science www.reachoutcpd.com , https://pstt.org.uk/resources, LBQ-x2 activities posters / books, candles, torches, mirrors, prisms in the science cupboard, Mary Maynard information https://www.twinkl.co.uk/resource/science-scientists-and-inventors-marie-maynard-daly-year-6-lesson-pack-3-tp2-s-317 https://www.twinkl.co.uk/resource/all-about-marie-maynard-daly-ks2-powerpoint-t-tp-2550179 LBQ- x4 activities under Y5 on circulation system posters / books, human autonomy models, in the science cupboard, Visitor- a nurse.