Newlands Junior School

We are Proud

Health & Wellbeing	Environment	Global Community	Creativity	Possibilities
				

Y3	Y4	Y5	Y6
Animals including humans	**Animals including humans**	**Animals including humans**	**Animals including humans**
National Curriculum • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.	**National Curriculum** • describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey	**National Curriculum** • describe the changes as humans develop to old age	**National Curriculum** • identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function (citizenship) • describe the ways in which nutrients and water are transported within animals, including humans
Wilhelm Rontgen (Mechanic engineer and physicist) –produced and detected electromagnetic radiation, also known as x-rays.	**Pierre Fauchard** (Physician) known as the 'father of modern dentistry because he revolutionised oral hygiene and preventative care.	**Elizabeth Blackwell** (Doctor) pioneered the role of women in medicine, became the first woman to gain a medical degree in the USA after being refused in the UK.	**Daniel Hale Williams** (Doctor) performed the world's first open heart surgery and his understanding of the circulatory system led to medical advances.

I understand that humans and some animals have skeletons for support, protection and movement *The skeleton has a skull, which protects our brain and ribs protect the heart and lungs.* *There are 600 bones in our body.* Label a skeleton with skull, ribs and what they protect, plus pelvis, femur, radius and fibular. Explain the three reasons why we have a skeleton. **Vocabulary: skeleton, bones, skull, ribs, femur, radius, pelvis and fibular, joints**	**I can identify the different types and functions of teeth** ***Pierre Fauchard*** *(Physician) known as the 'father of modern dentistry because he revolutionised oral hygiene and preventative care.* *Humans have different types of teeth: incisors, canines, premolars and molars.* *Incisors - Humans have 8 incisors altogether; 4 in the upper jaw and 4 in the lower jaw. Incisors are used for biting and cutting food.* *Canines - Humans have 4 canine teeth, one in each quarter of the mouth, on either side on the incisors. Canines are used for tearing and ripping food.* *Pre-molars - Humans have 8 premolars, two in each quarter of the mouth. Pre-molars are used for holding and crushing food.* *Molars - Humans have 9 molars, two in each quarter of the mouth. Molars are used for grinding food.* *Wisdom teeth - Humans can have up to 4 wisdom teeth, although not everyone has them. Wisdom teeth no longer have a function.* *Animals have teeth appropriate to the food they eat.* *Carnivores have sharp slicing teeth for eating meat.* *Herbivores have flat, broad molars and premolars for grinding tough vegetation and often have incisors designed for cropping or cutting plants. Many herbivores lack or have reduced canines, which are more prominent in carnivores.* Write and match statements to the correct teeth. **Vocabulary: canine, incisor, molar, pre-molar, wisdom teeth, carnivore, herbivore** **Red pen link: oral hygiene, brushing twice a day**	**I can use secondary sources to research gestation periods in mammals** *Cells develop and grow into a foetus inside the human mother's uterus, after around 9 months a baby is born.* Research using QR codes and round the room. **Vocabulary: foetus, embryo, uterus, baby,** **Red pen link: the care we need and give during each stage of development**	**I can use scientific models/diagrams to orally explain the circulatory system** **I can use scientific vocabulary in a written explanation** **2 lessons** *The circulatory system is made up of the heart, veins, lungs, arteries and blood which transport substances around the body.* *Blood carries water and nutrients from food that are used for energy, health and growth around the body.* *The circulatory system pumps blood from the heart to the lungs, back to the heart and onto the rest of the body in a figure of 8 system.* *Blood passes through each side of the heart separately in one circuit.* *The heart is a muscle.* *It has two separate sides. One side pumps blood full of oxygen from the lungs, the other side pumps bloody with the oxygen used up from the body. There are four parts of the heart -* *valve, left ventricle, right ventricle and atrium.* *Arteries are blood vessels that carry blood away from our heart.* *Veins carry the blood from the rest of the body, back to the heart.* Create a living model of the heart and circulatory system using themselves and equipment. Write explanation of the circulatory system. **Vocabulary: circulatory system heart, blood, blood vessels, artery, lung, vein, digestive, transport, gas exchange, nutrients, water, oxygen, deoxygenated, internal organs, skeletal system, valve, ventricle, atrium** **Red pen link: think of a change of lifestyle you could make to keep the heart healthier**

I can identify and classify the skeletons of different animals recognising vertebrate *Many animals have skeletons (vertebrates) to protect vital organs, allow movement through joints and support the body.* *Animals without skeletons are called invertebrates.* *Use multiple groups when sorting.* *Follow and complete simple classification keys with obvious differences* Introduce Wilhelm Rontgen. Display images of X-Rays. Sort out images of animals into vertebrates and invertebrates and use classification keys to sort further. **Vocabulary: skeleton, vertebrate, invertebrate** **Red pen link: How have X-Rays changed science today?**	**Set up simple practical enquiries, using comparative and fair tests** **(2 lessons)** *Observe the effect that changing one variable has on another whilst attempting to keep other variables constant in appropriate tests* Set up a class experiment with the 4 eggs in shells and 4 different drinks. The eggs will be placed in a cool, safe place in the classroom and observed every few days to check if there have been any changes. Children devise a test including a different variable: Different room temperatures Warm milk, cold milk Flat coke, fizzy coke Different quantities, Mixtures The investigation will be written up. Were there any weaknesses and could we make any improvements next time? **Vocabulary: fair test, beverages, chemical composition, observations** **Red pen link: recognise the effects of too many sugary drinks on your teeth**	**Describe the stages of human growth using scientific vocabulary** *Baby- the cells develop and grow into a foetus inside the mother's uterus, after around 9 months a baby is born.* *Infancy/Toddler- Children learn to walk and walk.* *Childhood - the period of a person's life between infancy and adolescence, typically from around ages 4 to 11. During this time, children experience significant development.* *Adolescence/teenager (puberty) - Puberty is the journey between adolescence and adulthood to reproduce. The changes, which may happen during puberty: possibly getting spots, body odour, voice breaks, body hair, periods. Hormones control these changes. They can be physical or emotional.* *Adulthood - A time of physical and intellectual maturity, often associated with taking on more responsibilities and making independent choices* *Old age - Our cells do not regenerate as quickly in old age and our immune system becomes weaker.* Complete a human life cycle. **Vocabulary: toddler, infancy, childhood, adolescence, puberty, hormones, maturity, cells, regenerate, immune system** **Red pen link: RSHE**	**I understand the importance of blood vessels and blood in the body** *Blood carries water and nutrients from food that are used for energy, health and growth around the body.* *Muscles need oxygen to release food to do their work.* *Oxygen is taken into the blood from the lungs. The heart pumps blood from the blood vessels to the muscles. The muscles take oxygen and nutrients from the blood. Blood vessels (veins and arteries) transport oxygen, water and nutrients around the body.* Make an apple clips to explain **Vocabulary: platelets, red blood cells, white blood cells, components, plasma, deoxygenated, capillaries, veins, arteries**
I can identify that humans and some other animals have muscles for support, protection and movement *Muscles are attached to bones by tendons. When a muscle contracts, it gets shorter but when it is relaxed it goes back to normal size.* Watch clips https://www.bbc.co.uk/teach/class-clips-video/muscles-and-bones/zfgtscw https://www.bbc.co.uk/bitesize/clips/zpp6n39	**Use scientific ideas and facts to describe and explain the digestive system putting these into oral/written sentences** **Describe simple models/diagrams** *The digestive system breaks down food into smaller pieces that our body can use for energy and growth and gets rid of waste.* *Salivary gland - The first part of digestion. Your salivary gland produces saliva. It is mostly made of water and helps you chew,*	**I can set up practical enquiries including fair and comparative testing, observing over time and pattern seeking.** **3 lessons and homework** *Reaction time is how quickly the body responds to a stimulus.* *Reaction time depends on how the brains processes information and make decisions.* *Take measurements with increasing accuracy and precision.*	**I can take measurements, using a range of scientific equipment taking repeat readings** **2 lessons** *Set up simple practical enquiries including fair and comparative testing, identifying and classifying observation over time and pattern seeking.* *Predict cause and effect (causal) and trends (relationship) and using prior knowledge.* *Describe and compare patterns, trends and relationships in data, charts and graphs.*

Children to make their own muscle. Once made, they will explain to their partner how it works, using key vocabulary such as contract and relax. **Vocabulary: muscle, contract, relax, movement**	*taste and swallow food. It contains enzymes which breaks down the food you eat.* *Mouth - The entry point for food and helps move food along the oesophagus.* *Teeth - Tear, cut and grind food into smaller pieces.* *Tongue- Helps mix the food and saliva.* *Oesophagus - A tube which runs from mouth to stomach. Muscles contract and relax as the food moves down the oesophagus.* *Small intestine - Where food is sent to be broken down and digested. It's where all of the nutrients can be absorbed into our blood.* *Large intestine - The leftovers that the body can't use go here. This is where water is absorbed from the waste to make sure the body doesn't lose too much water.* *Anus - The waste that our body can't use leaves the body through the anus when we go to the toilet.* Describe the food's journey. Talk like and expert. **Vocabulary: functions, saliva, enzymes, salivary gland, mouth, teeth, oesophagus, stomach, small intestine, large intestine, rectum, anus, digestion, bile, enzyme**	Describe reaction time and why this is important (protect self when in danger, during sport). Ask if children think reaction time is the same in everyone. Devise and carry out an experiment to test out this theory. Record findings in a table and scatter graph to show correlation between age and reaction times. Make comparisons, observe and look for patterns and relationships in data (compare 2 children, 2 toddlers etc.) Write up the experiment using the headings for Y5. **Vocabulary: child, adolescence, adult, old age, comparative, reaction time** **Red pen link: those successful in sport have good reaction times. Practicing reaction time through activities like agility drills can improve coordination and performance.**	Heartrate before and after exercise. Use scientific knowledge to ask how and when questions; eg; when does the heart rate start to increase? How does the body change? Write up the experiment. (include, charts, graphs). Identify and explain differences in sets of data. Use results to identify further possible investigations. **Vocabulary: comparative, classify, causal, trends** **Red pen link: the importance of exercise for the body**
I know that animals, including humans, need the right types of nutrition, exercise and hygiene *To stay healthy, humans need to exercise, eat a healthy diet and be hygienic.* *Blood vessels (veins and arteries) transport oxygen, water and nutrients around the body.* Discuss the different food groups. Sort food into the correct part of the Eatwell plate. Discuss food groups and their role. Improve a diet for the day. **Vocabulary: nutrition, nutrients, carbohydrates, protein, fats, fibre, water, vitamins, hygiene**	**Identify and describe scientific processes and ideas** Simulate the digestive system from mouth to anus using food, plastic bags, tights, towels, rubber gloves etc. **Vocabulary: as above** **Red pen link: Constipation can be helped by drinking lots of water – sugary drinks are like a food and will not help the flow of food through our systems.**		

Red pen link: Make choices health and well-being – choose between different foods and ensure a balance is eaten, undertake regular physical activities. **Recognise children can have allergies to certain foods and must not eat or maybe come into contact with them.**			
<u>I can investigate the effect of changing a variable</u> *A variable is something which can be changed or controlled (what you keep the same)* Carry out an investigation to find out if the length of the femur affects how far you can jump. Maintain variables e.g. starting point, type of jump. Put results in a table comparing length of femur and distance jumped. Make comparisons and draw conclusions. **Vocabulary: variable, control, change, affect, femur, comparison** **Red pen link: LP collaboration**			
<u>I can use my scientific knowledge to ask and investigate questions (why and what)</u> Children ask a question relating to the length of the bones in the forearm. Discuss the variable is the diffident lengths. What will be the controlled variable? Example – throw a ball. Size and weight of ball. Plan the investigation and carry out. Model and write conclusion. **Vocabulary: variable, control, change, affect, femur, comparison**			

Y3	Y4	Y5	Y6
Plants	**Living Things and their Habitat**	**Living Things and their habitat**	**Living Things and their habitat**
National Curriculum • identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal	**National Curriculum** • recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things	**National Curriculum** • describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals	**National Curriculum** • describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics
	Rachel Carson (American scientist) was one of the first people to use some words such as 'ecosystem' and 'food chains'. She discovered that pollution from farms was affecting the ocean and the animals in them. .	**Marjory Stoneman Douglas** (Writer and Conservationist) was an American journalist, author, women's suffrage advocate, and conservationist known for her staunch defence of the Everglades against efforts to drain it and reclaim land for development.	**Libbie Hyman** described the anatomy and characteristics of invertebrates and vertebrates to explain how they should be classified.
I can draw and label a diagram of a flowering plant using scientific vocabulary *Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers* *Roots anchor the plant into the ground and absorb water and nutrients from the soil.* *Stem holds the plant up and carries water and nutrients from the trunk to the leaves.* *Leaves make food for the plant using sunlight and carbon dioxide.* *Flowers use pollen to make seeds and grow new plants, which increases the chance of reproduction.* Draw and label a diagram. Explain each part using scientific vocabulary. Talk like an expert and explain each part to a partner.	**I know different types of living things and the seven processes of life** *The 7 processes of living things are: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition.* Mammal - breathes air, has a backbone, and grows hair Amphibian - mainly cold-blooded and live in water and on land. Known for their moist skin and for laying eggs, often in water. Reptile - cold-blooded, vertebrate animals with scaly skin, known for laying eggs. Fish - vertebrates that live in water. They breathe using special organs called gills. Birds - warm-blooded vertebrates identifiable by feathers, wings, toothless beaked jaws and laying of hard-shelled eggs.	**I can describe and compare the life cycles of different species** *All living things have a life cycle which includes growth and reproduction, eventually ending in death and decay.* *Most animals reproduce sexually. This involves two parents, a male and a female.* *The sperm from the male fertilises the female egg inside her body.* ***Mammal*** *Mammals reproduce by sexual reproduction* *The embryo grows inside the female.* *Female mammals give birth to live young and produce milk to feed their young. As an adult the male will mate with an adult female and reproduce.* ***Bird***	**I can identify observable characteristics used to classify living organisms** *Living things can be grouped, classified and identified.* *There are three kingdoms of living things: animals, plants, minerals.* *These kingdoms can be sorted into smaller groups or levels known as the Linnaean System: domain, kingdom, phylum, class, order, family, genus, species.* *The Linnaean system was created by Carl Linnaeus as a standard system for classifying animals.* *Taxonomy is the classification of living and extinct organisms.* - Odd one out. Discussion of which living thing is the odd one out and

Vocabulary: flower, seed, leaf, stem, roots, trunk, function, absorb, nutrients, carbon-dioxide, pollen, reproduction **Red pen link: Why do you think flowers are important? (pollen, bees)**	Describe the features of each category of animal and name examples. Research the 7 processes of life and explain. **Vocabulary: mammals, amphibians, reptiles, movement, respiration, sensitivity, growth, reproduction, excretion, nutrition**	*Female birds lay eggs with hard shells. These may or may not be fertilised. The baby hatches from the egg and is fed by the parents.* ***Amphibian*** *Amphibians reproduce by sexual reproduction. Some amphibians go through a process of metamorphosis.* *The female lays a mass of eggs which are fertilised by the male. After 2-25 days the tadpoles hatch from the eggs. This grows into a frog who will then continue the cycle.* ***Insect (Complete Metamorphism- butterfly)*** *Fertilised eggs are laid by the female. The eggs hatch into a larvae (caterpillar). This forms a case around itself called a chrysalis where it turns into a butterfly.* ***Insect (Incomplete Metamorphism- newt)*** *The female lays fertilised eggs in or near the water. The eggs hatch into nymphs. The fully grown nymph crawl out of the water and shed their skin, emerging as a dragonfly.* ***Monotremes*** *The only living mammal which lays eggs as opposed to bearing live young* Groups find information about different species and prepare a presentation. Talk like an expert to inform the class about what they have found out. **Vocabulary: amphibian, mammal, monotremes, human, insect, metamorphism, bird, fish, life processes, reproduction**	why? Different possible answers but children must justify. - Discuss classification and talk about observable characteristics. - Show children how scientists have identified us as homo sapiens by working through the criteria. - Introduce children to Carl Linnaeus – children to create a fact file. **Vocabulary: classify, compare, Linnaean, classification, domain, kingdom, phylum, class, order, family, genus, species, homo sapiens, taxonomy** **Red pen link: link to previous learning on the 7 processes of living things**
Use knowledge and understanding to ask why and what if questions Devise scientific questions and research answers regarding the parts of a flowering plant. **Vocabulary: flower, seed, leaf, stem, roots, trunk, function, absorb, nutrients, carbon-dioxide, pollen, reproduction**	**Create and explain my own criteria for sorting** **Construct a simple classification key** ***Rachel Carson*** *(American scientist) was one of the first people to use some words such as 'ecosystem' and 'food chains'. She discovered that pollution from farms was affecting the ocean and the animals in them.*	**I can create a criteria for sorting which includes sub-groups** Sort living things into groups e.g. vertebrate, invertebrate. Sort each group into sub groups e.g. vertebrates with skin or fur, flightless/birds that fly. **Vocabulary: criteria, sub group**	**I can use observable characteristics to sort a range of plants and animals.** *Living things can be grouped, classified and identified.* Use the Linnaean system to classify a range of animals and plants. (use Plan Bee resources) **Vocabulary: see above**

Red pen link: LP questioning	*Living things can be grouped in many different ways e.g. by how they look, where they live and what they eat.* In groups, children will complete a classification grid focusing on the characteristics of animals within an environment. They then compile their own classification key for the a further animals, thinking of their own yes/no questions. Children then move around the class working through the classification grids produced by each group **Vocabulary: movement, respiration, sensitivity, growth, reproduction, excretion, nutrition, identify, classification key, animals, living things, vertebrate, invertebrates, amphibian, mammal, bird, fish, reptile** **Red pen link: understand plants and animals share the same 7 life processes as humans.**	**Red pen link: LP Reasoning and questioning**	
I can describe the life cycle of a plant and label a diagram using scientific vocabulary *Name the different stages of the plant cycle. Germination, growing and flowering, pollination, fertilisation and seed formation and seed dispersal.* *Germination is when the seed begins to grow and it needs water, light and warmth.* *Pollination is when pollen is transferred from the anther to the stigma by an insect.* *Fertilisation* happens when the pollen travels from the stigma down the style to the ovary. *Seed formation and dispersal* The pollen joins with an ovule to form a seed. Once seeds are fully formed the seeds disperse by water, wind, shaking, eating, dropping, bursting and carrying. Act out the cycle.	**I can set up simple and practical enquiries including fair and comparative testing** **2 lessons** *I can make systematic and careful observations, using a table to record my results.* Children are to carry out an experiment into living conditions woodlice prefer. Children are to set up an experiment to test different conditions. They will combine all the elements of a suitable woodlice habitat (soil, leaves, stones, twigs). In the group, each child will have a control condition and change one of the variables (block out the light, add water, etc) to discover which conditions woodlouse prefer. After a while, count the number of woodlice in each part. Record in a table. Make conclusions. **Vocabulary: identify, classification key, animals, plants, living things,**	**I can draw, label and annotate my own diagrams using scientific vocab and information** *The parts of the flower are pollen, anther, filament, stamen, sepal, stem, ovule, ovary, style, stigma, and carpel.* Dissect a flower identifying parts and label/add information. **seed, pollen, anther, filament, stamen, sepal, stem, ovule, ovary, style, stigma, carpel**	**3 lessons investigation and enquiry** **I can plan a reliable and fair test ensuring the controlled variables are kept the same** Recap microorganisms. Explain that yeast is a living micro-organism (a type of fungus) that eats sugar and produces a gas called carbon dioxide (CO_2). This is what makes bread rise! Demonstrate activating yeast. Introduce the question: How does changing one variable affect how much gas yeast produces? Examples of variables: type of sugar, amount of sugar, temperature of water, amount of yeast, type of liquid. Dependent variables (the one you measure): how much gas is made.

Draw and label diagram using scientific vocabulary. **Vocabulary: flowering plant, seed, pollen, functions, life cycle, dispersal, pollination, fertilisation, stigma, style, ovule, ovary**	**vertebrate, invertebrates, amphibian, mammal, bird, fish, reptile, enquiry, systematic, careful, table** **Red pen link: LP planning/revising**		Control variables (keep the same): size of container, amount of liquid, time the experiment runs, type of yeast, room conditions (light, temperature). Record results in a table and turn them into a graph. Write up the experiment using the y6 criteria. Model writing a conclusion using sentence stems. Children use these to write a conclusion for their own results. Extensions: What happens if you use juice instead of water? Do different sugars affect yeast more or less? Can yeast still work in salty or acidic liquids? **Vocabulary: microorganisms, yeast, variables, independent variable, dependent variable, control variable, reliable, fair test, organism** **Red pen link: LP Questioning and reasoning**
I can investigate the transport of water in plants **2 lessons** *Summarise findings linked back to the investigation.* *Suggest improvements and raise further questions about the investigation.* *Use scientific and own knowledge to predict what might happen in an investigation.* Identify how water is transported around plants. Carry out investigation to watch how water travels in plants. How does temperature / amount of water affect the how fast the water is transported around the plant? Make predictions and explain.	***I recognise changes in the environment can impact living things and their habitats*** *Investigate: How does the removal of one species from an environment affect others?* Look at the local area and the building that is taking place. What happens to wildlife? How do things change? Create a venn diagram to sort changes- positive, negative, mixed impact e.g. deforestation to build houses, new pond in a school garden, a beach is cleaned by volunteers, plastic rubbish ends up in the ocean, new wildlife reserve is protected, a river floods a village, a field is sprayed with pesticides. Make a cause and effect diagram using the headings environmental change, what happened, effect on animals/plants, positive/negative	**I understand and can explain sexual and asexual reproduction** *Flowers contain mail sex organs called stamens and female sex organs called carpel. Pollen must be moved to a part of the carpel called the stigma for reproduction to take place. This is called pollination.* *Seeds are the product of sexual reproduction. The plant that grows from them are not identical to the parent plants.* *Asexual reproduction creates new plants that are identical to the parent.* *Asexual reproduction needs only one parent to make an offspring.* Advantages and disadvantages of sexual/asexual reproduction. Similarities and differences.	

Write up experiment using the headings: Question – why, what if Equipment Labelled diagram Prediction Variables Method Conclusion **Vocabulary: summarise, improvements, predict, investigate, transport, travel, temperature, explain, conclusion** **Red pen link: the effects of dehydration, how much do we need to drink?**	**Vocabulary: deforestation, environment, flowering, non-flowering, impact, litter, nature reserve, habitat, pesticide** **Red pen link: Ways we can have an impact the environment**	**Vocabulary: reproduction, asexual, sexual, fertilisation, pollination, seed pod, bulb, cuttings, dispersal, organisms, cell**	
	I can construct and interpret a variety of food chains, identifying producers, predators and prey *A food chain shows how energy and nutrients pass from one living thing to another as they eat or get eaten by each other.* *A producer (a plant) makes the food using water, air and the energy of the sun.* *This is passed to the consumer (a herbivore) that eats it.* *It is then passed to any animal (a carnivore) that eats the consumer.* Create food chains. Identify errors and explain why. **Vocabulary: food chains, producer, prey, predator, herbivore, carnivore, consumer** **Red pen link: LP making links**	**I can explain the lifecycle of a bean using scientific vocabulary** *The seed has an embryo inside when the pollen fuses with the flower's stigma.* *Once the seed receives water, warmth and air the shoot and the root start to grow.* *The green leaves which grow allow the plant to use sunlight to make food (photosynthesis).* *Roots grow deeper in search of nutrients and water.* *Flowers, once pollinated, grow into beanpods.* *The cycle recommences.* Show a bean at various stages of development and discuss what is happening at each stage. Take photos and create a time lapse video on apple clips describing each stage. **Vocabulary: seed, germination, root development, shoot, seedling, leaves, mature plant, pollination, photosynthesis** **Red pen link: Why do we need to protect bees? What would happen if they became extinct?**	

Y3	Y4	Y5	Y6
Light	**Sound**		**Light**
National Curriculum • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by an opaque object • find patterns in the way that the size of shadows change	**National Curriculum** • identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases		**National Curriculum** • recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them
Lewis Latimer (Inventor)- inventor and draftsman for the patent of the light bulb.	Alexander Graham Bell (inventor) was the first person to create the telephone. On the 10th March 1876 he and Thomas made the first phone call to each other.		Alhazen (scientist/father of modern optics) discovered light comes from the sun as its source, reflecting from an object to the eye to be seen.

I can identify reflective and non-reflective materials making observations and gathering evidence **2 lessons** *Light comes from light sources* *Dark is absence of light* *The sun is a source of light.* *When light hits a surface it is reflected and bounces off. The reflected light hits our eyes and then we can see the object.* *Shiny objects have surfaces which are good at reflecting light.* *When there is less light, more reflective materials are easier to see than less reflective materials.* When do we wear/use reflective materials- in the dark, on the road. Find out which materials reflect the most light. What do these have in common (shiny/smooth) Record similarities and differences and make a decision about which materials are the most reflective linking back to the question. **Vocabulary: light, source, visible, dark, reflect, bounce, surfaces** **Red pen link: Cyclists wearing reflective materials. Link to road safety in Citizenship.**	**I understand how sounds are made through vibrations** *Sound is made by vibrations which make the air move.* *When an object vibrates, it causes the air particles around it to vibrate as well, creating a sound wave.* *If these sound waves reach your ear, you hear them as sound.* *The ear drum is a flap of skin stretched tight and vibrates when sound hits.* Rulers, Rubber bands, Drums, Place a ruler halfway over the edge of a desk, hold it down and "twang" it. Observe the movement. Stretch rubber bands over a box – pluck them and describe what happens. Hit a drum and feel the surface. What do you see or feel when the sound is made? How do we know it's vibrating? Stretch cling film tightly over a bowl. Sprinkle rice on top. Make a loud noise nearby. Make observation: The rice jumps when the sound occurs! Explanation: The sound causes the cling film to vibrate – the rice moves because of those vibrations. **Vocabulary: vibrations, observations** **Red pen link: loud noises can affect our hearing**		**I can name and describe the functions of the parts of the eye** *Cornea- (transparent) allows light to enter the eye.* *Lens- focuses light onto the retina.* *Pupil- a hole through which light passes to enter the eye.* *Iris- contracts and relaxes to control the amount of light entering the eye.* *Retina- the lining of the back of the eye which contains light receptors.* *Ciliary muscle- can change the shape of the lens to help focus light on the retina.* *Optic nerve- bundles of neurons which carry impulses from the eye to the brain.* Draw and label and describe to a partner what each part does. **Vocabulary cornea, lens, retina, pupil, iris, contract, relax, retina, ciliary muscle, optic nerve, neurons, impulses** **Red pen link: importance of looking after eyes, visit to opticians if struggling to see, wearing glasses.**

I know that light from the sun can be dangerous and we must protect our eyes **2 lessons** *Translucent is when some light comes through but it is scattered so we can't see.* *Transparent materials allow light to travel through them easily.* *Opaque materials do not let light through.* Using a torch and a variety of materials. Shine the torch through the material (clear plastic, sunglasses lens, black fabric, tissue paper, foil, cellophane) onto a white surface. Rank the materials which block out the most light. Put results into a table and compare. **Vocabulary: ray, beam, illuminate, ray, danger, eye, retina, straight** **Red pen link: safety in the sun**	**I can draw and label my own diagram and describe the functions using scientific vocabulary.** *The human ear has three main parts: the outer ear, middle ear, and inner ear.* *Each part plays a role in how we hear and maintain balance.* *The outer ear, including the pinna (or auricle) and ear canal, collects and directs sound waves.* *The middle ear contains the eardrum and three tiny bones (hammer, anvil, and stirrup) that amplify sound vibrations.* *The inner ear, including the cochlea, converts these vibrations into electrical signals that are sent to the brain.* **Vocabulary: pinna/auricle, canal, eardrum, hammer, anvil, stirrup, cochlea** **Red pen link: Some people are unable to hear and are deaf. May wear a hearing aid. May communicate by lip reading or sign language**		**I understand that light travels in straight lines and how shadows are formed.** **I know why shadows have the same shape as the objects which cast them** **2 lessons** *Light appears to travel in straight lines.* *A shadow is always the same shape as the object that casts it. This is because when an object is in the path of light travelling from a light source, it will block the light rays that hit it, while the rest of the light can continue travelling.* *Light travelling in straight lines can be used to explain why a shadow is the same shape as the object that casts it and how the shape of shadows can be changed.* Make a model using string and coloured crayons to demonstrate how light travels. Use this to explore and create shadows. Enquiry question – is a shadow always the same size as the object that casts it? Children to make initial predictions. Children to investigate. Go through their finding and share scientific explanation. **Vocabulary: light source, visible, lens, angle straight, ray, beam, shadow, size, distance, change, tilt, transparent, translucent, opaque** **Red pen link: Recap safety of never looking directly at the sun and wearing sun screen.**
I can take accurate measurements using standard units **2 lessons** *Shadows form when light is blocked.* *Opaque materials block all light.* *A shadow is formed when an opaque material completely blocks the light. Shadows can also be elongated or shortened depending on the angle of the light source.*	**I can plan and carry out an investigation looking at variables and record findings in a table** *The volume is the loudness of the sound.* *The volume of the sound depends on the vibrations that produced it.* *The longer the distance, the fainter the sound.*		**I can select equipment to investigate how light is reflected, justifying my choices** **2 lessons** *Light travels in a straight line at 160,000mps.* *When light hits a shiny, polished surface it is reflected and bounces off.* *We can see a light source because some of the light from the source enters our eyes.*

A shadow can change size depending on the distance the object casting it is from the light source. Carry out shadow mini experiment Make a prediction what will happen to a shadow when we move the torch closer or angle. Set up experiment – place objects on a flat surface. Shine torch from 10,20, 30cm. Measure the length of the shadow and record results in a table. Extension – what happens when we shine directly, horizontally, diagonally? How does this relate to the sun? **Vocabulary: blocked, opaque, shadow, elongated, shortened, distance, position** **Red pen link: never look directly at the sun.**	Children set up an investigation to see if anything affects the volume of sound. Discuss what may have an effect - direction, wind, consistency of sound. Children create a question and plan the investigation. Record findings in a table. Was the test fair e.g. did the wind strength change? **equipment, method, prediction, fair test, results, conclusion, fainter** **Vocabulary: volume, loudness, faint, loud, quiet, distance, sound source**		*We can see objects because they reflect some of the light that falls onto them into our eyes.* *Periscope- A simple periscope is a tube with a mirror at either end. The mirrors need to be positioned so that the light is reflected from the mirror at one end, down the tube to the other mirror, then out of the tube to the observer's eyes.* Investigate reflection using mirrors. Children to create and carry out their own investigation of how to make a light source shine around an object. Write up using Y6 headings. **Vocabulary: light, reflect, visible, angle straight, ray, beam, source** **Red pen link: LP distilling, revising**
	I understand that pitch is how high and low a sound is **2 lessons** *The pitch of a sound is how quickly the sound wave (vibration) travels. If a sound wave is travelling quickly, we say that it is a high sound. If a sound wave is travelling slowly, we say that it is a low sound.* Introduce pitch and its sound waves and compare high/low sounds. Watch a clip about pitch Introduce 'The Challenge' and explain that we are investigating the question 'How is different pitch created?" Give children a set of straws and explain we want to use these to create high/low pitch sounds. Ask children to predict how they can make the different sounds. Children experiment using the straws to make different pitch. Can you make a variety of pitches? Once made, the children will present what they have done in their books, drawing a		**I can draw, label and annotate my own diagrams using scientific vocabulary and information** **2 lessons** *Refraction is the bending of light and uses prisms, mirrors and rainbows.* *Explore how optical instruments work e.g. periscope, binoculars, mirror, prism, magnifying glass.* *How can refraction cause optical illusions?* Explore refraction. Use pen in water first and children have a go at explaining what is happening. Continue to investigate refraction using further experiments. Children to record predictions, results and explanations. **Vocabulary: light, reflect, refract, observe light source, travel**

	diagram and explaining how pitch has been created answering our question Watch clips – looking at real panpipes, how to make them with straws and then listen to panpipe music **Vocabulary: pitch, high, low, frequency** **Red pen link: to learning in music**		
	I understand the significance of Alexander Graham Bell on our lives today *Alexander Graham Bell (inventor) was the first person to create the telephone. On the 10th March 1876 he and Thomas made the first phone call to each other.* Watch a clip with an actor posing as Alexander Graham Bell **Vocabulary: inventor** **Red Pen link: The impact inventors have on our lives**		

Y3	Y4	Y5	Y6
	States of Matter	**Properties of Materials**	
	National Curriculum • compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	**National Curriculum** • compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	
		Stephanie Kwolek (Chemist) – created a very hard plastic which was five times stronger than steel and lighter- Kevlar.	

	I recognise the properties of materials and know that some materials change state when they are heated or cooled *Solids stay in one place and can held, they keep their shape, they can be poured e.g. salt, sugar and cut or shaped. The particles in a solid are close together, so there is little movement.* *Liquids can flow or be poured easily, they are not easy to hold and can change their shape depending on the container they are in. the particles in a liquid are not as close together and so they are able to move more.* *Gases are often invisible; they do not have a fixed shape and can be squashed. The particles in a gas spread out across any space and are constantly moving.* Discuss the properties of solids, liquids and gases using some children packed into a skipping rope as an example of each Children match the picture to the particle arrangement to the properties. Sing 'The Matter Chatter' song Describe and group materials based on their state of matter e.g. solid, liquid or gas and the changes that can occur. **Vocabulary: solid, liquid, gas, shape, particles, movement, change state, heating, melting, cooling, invisible, flow**	**I can use scientific vocabulary to describe and group materials** Describe and group materials based on their properties e.g. hardness, solubility, transparency, conductivity, and response to magnets. Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets Answer questions from previous and new learning. QR codes and information around the room. Discuss vocabulary. Match meaning of scientific terms to be used in new topic with their definition. **Vocabulary: magnetic, reflective, absorbent, permeable, flexible, translucent, hard, flammable, insulating, transparent.** **Red pen link: Making links with prior learning and when do you use these different materials in your life and why?**	

		I can give reasons for the particular uses of everyday materials *Different materials are suitable for different things because they possess unique properties that make them well-suited to specific tasks.* *These properties, such as strength, flexibility, conductivity, and transparency, dictate how a material will perform in a given application, for example, a strong, rigid material like metal is ideal for building structures, while a, transparent material like glass is used for windows* Model and discuss how different materials have different uses and that those properties make them more suitable for certain uses than others. Mini investigation to test conductivity, hardness, transparency and magnetism. Record findings on results table. **Vocabulary: property, flexibility, rigidity, hardness, transparency, magnetism, conductivity**	

	<u>Make systematic and careful observations</u> *Some materials can change state.* *Heating causes some solids to melt into liquids* *Know that materials change state at different temperatures* *Water freezes at 0 degrees.* Give children the question – how do different materials change when heated? (e.g.s ice, butter, chocolate, wax, ice cream, metal) Children to devise the experiment – what will they use, where will they put materials, how long will they test for. Observe results and time. Record results in a table and write a short explanation of what happened to each solid Establish that different solids have different melting points. **Vocabulary: solids, liquids, melting, change of state, temperature, observe** **Red pen link: LP Noticing and making links**	**<u>I can investigate soluble and insoluble materials making and testing predictions 2 lessons</u>** *When substances dissolve it looks like it has disappeared but it in fact makes a transparent liquid called a solution.* *Substances that dissolve in water are called soluble substance e.g. sugar and water and salt and water.* *Substances that don't dissolve in water are called insoluble substances.* Plan an investigation to test if materials are soluble or insoluble. Discuss equipment, prediction, method, fair test. Write up in science books. Sentence stems and key questions on board to support. Carry out experiment in table groups and record results on a table. Model writing the predictions explaining why. **Vocabulary: solid, liquid, gas, soluble, insoluble, dissolve, transparent, solution, substance** **Red pen link: Think of examples when they have seen or used any of these processes?**	
	<u>I can identify when and how properties change recognising similarities and differences.</u> We are investigating the question Can all liquids change state to become a solid?' List liquids - oil, vinegar, water, coke, milk, honey, washing up liquid and fruit juice. Children make a prediction and set up the investigation. Children to discuss fair test – same amount of liquid, time, temperature. Freeze for 24 hours	**<u>I can select equipment for a task and justify my choices</u>** *When substances dissolve it looks like it has disappeared but it in fact makes a transparent liquid called a solution.* *Substances that dissolve in water are called soluble substance e.g. sugar and water and salt and water.* *Substances that don't dissolve in water are called insoluble substances.* *Sieving separates a solid and a liquid e.g. sand and water.* *Filtering can be done by passing a mixture through filter paper, the water is able to*	

	Discuss results, identifying differences in sets of data. Write up the conclusion. Model first. **Vocabulary: change of state, liquid, solid, freezing, temperature, fair test, prediction** **Red pen links: safety – never taste things when we don't know what they are**	*pass through tiny gaps but sand or glitter cannot.* *Evaporating can separate salt from water by boiling the solution. The water will evaporate and the salt will be left behind.* Explain we can get the original material back through sieving, filtering and evaporation. Show examples of each. Give children - gravel and sand, salt dissolved in water, sand and water Ask: Can we separate these? How could we do it? Try each method on each mixture. Which works best and why? Discuss safety. **Vocabulary: mixtures, dissolve, soluble, insoluble, evaporation, filter, sieving,**	
	I can investigate how temperature affects the rate of evaporation **2 lessons** *Some liquids evaporate into gases.* *Evaporation is changing water from a liquid to a gas.* Children to ask relevant questions and make their own investigation to test how temperature affects the rate of evaporation. Make a prediction to begin. Look at headings in our investigations. Plan for each one. Ensure a fair test is carried out; eg; same amount of liquid. Use thermometers to test the temperature of the liquid when evaporation begins. Carry out the investigation and write up. **Vocabulary: observation, evaporation, mass** **Red pen link: safety around hot water, scalds, first aid**	**I can explain why and how some properties change and some don't** *Mixing can cause an irreversible change e.g. vinegar and bicarbonate of soda.* *Burning can cause an irreversible change e.g. burning wood to get ash.* Teach irreversible changes. Demonstrate some examples. How are these different to reversible changes? Making plastic experiment. Children follow instructions. What happened? Is it an irreversible change? **Vocabulary: reversible: irreversible, chemical changes, burning, mixing, dissolving.** **Red pen link: LP noticing**	

	I can describe the changes of state during the processes of evaporation and condensation *Some liquids evaporate into gases. Cooling causes gases to condense into liquids and liquids to freeze into solids.* *Evaporation is changing water from a liquid to a gas.* *Condensation is when 'water vapour' changes from gas to a liquid.* Evaporation – go outside and draw a shape/picture using a saturated sponge. The children will draw around the shape with chalk so that the outline is clear. Return later to see what has happened. Boil a kettle near to a window in the classroom. Watch the window steam up and condense. What happens after? Explain the processes of evaporation and condensation that they have just witnessed using scientific evidence. **Vocabulary: evaporation, condensation, degrees, Celsius, temperature, substance.** **Red Pen Link: Look for condensation and evaporation in day-to-day life e.g. in your car or in the kitchen**		
	I can use scientific information and vocabulary to describe the part that evaporation and condensation play in the water cycle *Condensation- Water vapour in the air cools down and changes back to tiny drops of liquid water, forming clouds.* *Evaporation - the process where a liquid changes into a gas.* *The water cycle describes the continuous movement of water on, above, and below the surface of the earth.* *When the clouds get heavy, the water falls back to ground in the form of rain or snow, this is called precipitation. Water then*		

	returns to the sea and the process begins again. Water evaporates, condenses into clouds, precipitates back to earth, and then flows back into bodies of water, continuing the cycle. Create a collage to represent the water cycle. Describe the process using scientific vocabulary. **Vocabulary: water cycle, evaporation, escape, condensation, precipitation, degrees, Celsius, temperature** **Red pen link – the effect of drought, some countries do not have enough rain which can lead to poor crops and famine**		

Y3	Y4	Y5	Y6
Forces and Magnets	**Electricity**	**Forces**	**Electricity**
National Curriculum • compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles predict whether two magnets will attract or repel each other, depending on which poles are facing	**National Curriculum** • identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors	**National Curriculum** • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect	**National Curriculum** • associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram
	Alessandro Volta (Physicist and Chemist) known for creating the battery and being a pioneer in electrical science.	Isaac Newton (scientist) developed Newton's Laws of Gravitation and Motion. Galileo (Italian scientist) who dropped two objects from the tower of Pisa, proving all objects fall at the same rate, regardless of their mass.	
I can explore the two poles of a magnet, predicting whether two magnets will attract or repel each other *Magnetism is a non-contact force as it works through an invisible magnetic field.* *Magnets have a north and south pole.* *If the south pole faces another magnet at north it will repel. If they both face south, they will attract.* Draw labelled diagram showing a bar magnet, labelled north and south. Complete the quiz sheet predicting whether bar magnets will attract or repel.	**I can identify common appliances that run on electricity and understand the need for safety when using electricity** *Many household appliances run on electricity. Some plug into the mains and others run on batteries.* *A source of electricity (mains or battery) is needed for electrical devices to work.* Which room has the most electrical sockets in your house and why? *Electricity can be made from a primary source of energy which includes: hydro and wind, solar, geothermal, fossil fuels and nuclear.*	**I can identify scientific evidence that has been used to support or refute ideas** *Gravity is a force which pulls everything towards the centre of the e*arth and causes *objects to fall.* *Newton's Law of Universal Gravitation explains that every object in the universe attracts every other object. The strength of this attraction, or force, depends on how big the objects are and how far apart they are.* *Galileo (Italian scientist) dropped two objects from the tower of Pisa, proving all objects fall at the same rate, regardless of their mass.*	**I can use recognised symbols when representing a simple circuit in a diagram comparing which circuits will work** *Batteries are a store of energy. This energy pushes electricity around a circuit.* *A current is the steady flow of electrons.* Draw circuit diagrams using the correct symbols – cell, lamp wires, bulbs, motor, switches (open and closed) and buzzers. Compare and give reasons for why components work and do not work in a circuit. – A series circuit will not work if a lamp is broken or a wire is disconnected.

Vocabulary: attract, contact, distance, forces, magnetic, magnet, poles, pull, push, attract, repel, resistance **Red pen link: Do you think magnets are useful in every-day life? (clothes, watch straps, MRI machines in hospital, compasses, metal detectors)**	Safety - why is there a pull cord in the bathroom and no plug sockets? Dangers of water and electricity **Vocabulary: Electricity, mains, appliances, battery, device, electric current.** **RP link: Understand how electricity is important in our lives.**	Research Galileo and Newton What they studied, their discoveries, their methods. Galileo: Used experiments and telescopes, Newton: Wrote laws and used maths, Both: Studied gravity and motion. Complete a Venn diagram comparing the two. **Mini Investigation:** Drop two objects of different weights (e.g., a book and a pencil) from the same height. Predict: Which will hit the ground first? Observe: Do they land at the same time? This is similar to what Galileo did—he showed that heavy and light objects fall at the same speed (without air resistance). **Vocabulary: force, motion, earth, gravity, unsupported, theory of gravitation, fall, attraction, mass** **Red Pen link: making links to space learning. Which scientist would you want to be and why?**	**Vocabulary: electricity, electric, battery, cell, bulb, lamp, wire, buzzer, circuit, components** **Red pen link: Y4 inventors and the impact on our lives**
I can compare and group materials based on their properties *Use scientific evidence to answer questions to support findings* *Ask relevant questions to investigate* *Magnets can attract some types of metal but not all due to their composition.* Investigate 'Which of these everyday materials are magnetic?' Children pose the scientific question. Discuss the method. Highlight whether we are going to keep anything the same. Carry out an investigation to answer their question. Look for patterns. Conclusion – What did we find? recognise metal/non-metal and that some metals are not magnetic. **Vocabulary: materials, metals, non-metals**	**I can construct a simple series circuit, identifying its components and can say whether the circuit will work** *An electrical circuit consists of a cell or batteries connected to another component using wires.* *If there is a break in the circuit, a loose connection, or a short circuit, the component will not work.* Construct a series circuit, identifying and naming the components. – cell, wires, bulbs, switches and buzzers. Half the class create a circuit which will work, half which won't. Identify which will/will not work and say why. Ask why and what if questions when testing and discussing evidence. **Vocabulary: battery, bulb, lamp, buzzer, cell, wire, components, circuit, simple series circuit, device, electric current**	**I can use my knowledge and understanding to ask questions we can investigate** **2 hours** *Air resistance and water resistance are forces against motion caused by having to move air and water out of their way.* *Some objects/animals are streamlined to minimise the effects of air and water resistance.* Parachute investigation: children come up with their own questions. Does the size of the parachute effect how fast it falls? Does the mass of the object attached to the parachute affect how fast it falls? Does adding wind resistance affect how fast it falls? Children plan, carry out and write up the experiment using the investigation headings. Record results in a line graph. Explain differences in sets of data. **Vocabulary: mass, upward force, gravity, resistance, surface area**	**I can plan a reliable and fair test ensuring the controlled variables are kept the same** **2 hours** *The number and voltage of cells in circuit links to the brightness of a lamp and the volume of a buzzer.* *The longer the wire the duller the buzzer noise would be.* *The more batteries used the brighter the lamp as it will push the electricity around faster.* *A lamp gets dimmer if thinner wires are used.* *When the battery's energy is gone it stops pushing. Voltage measures the push. Voltage is the force that makes the electrical current flow.* Investigate how variations affect bulbs and buzzers Devise and test a statement e.g. if I add more batteries the bulb will get brighter because there is more energy in the circuit

		parachute, streamlined, fair and comparative testing.	Write up the investigation using the year 6 headings Ensure controlled variables are kept the same and independent variable are changed to test the hypothesis **Vocabulary: electricity, electric, battery, cell, bulb, lamp, wire, closed switch, open switch, buzzer, motor, circuit, series circuit, circuits, components, function, voltage, brightness, loudness, volume, symbols, diagram, insulator, conductor** **Red pen link: safety**
I know that some forces need contact between two objects, but magnetic forces can attract at a distance *Magnetism is a non-contact force as it works through an invisible magnetic field.* *Forces can be pushes or pulls.* *Friction is a force that acts between two surfaces or objects that are moving (or trying to move) across each other.* *Some forces require contact (friction and some do not (magnetism)* Paperclip investigation. Identify the focus will be on horseshoe and bar magnet. Investigate using paperclips and each magnet on different surfaces. Make predictions- which do you believe would hold the most paperclips? Which do you think would hold the fewest quantity of paperclips? Children to fill in results table and transfer these results to the bar chart. **Vocabulary: contact, distance, forces, objects, poles, attract, repel, magnetic, properties, pull, push, strength, surface**	**I can recognise that a switch opens and closes a circuit** *A switch can be added to the circuit to turn it on and off'* Build a circuit with a switch. Test when open and closed. Describe the function of a switch in a circuit. - When a switch is open (off), there is a gap in the circuit. Electricity cannot travel around the circuit. When a switch is closed (on), it makes the circuit complete. Electricity can travel around the circuit. **Vocabulary: battery, bulb, lamp, buzzer, cell, wire, switch, components, circuit, simple series circuit, electric current.** **Red pen link: Why are switches so important in our lives?**	**I can take measurements with increasing accuracy taking repeated readings** *Air resistance and water resistance are forces against motion caused by having to move air and water out of their way.* *Some objects/animals are streamlined to minimise the effects of air and water resistance.* How does surface area affect water resistance? Teacher demonstrate plasticine experiment demonstrating how the shape/surface area impacts water resistance. How can they make it a fair test? What are their predictions? How will they record their results? Use results to identify further possible investigations. **Vocabulary: gravity, resistance, drag, friction, surface area** **Red pen link: LP Collaboration and planning**	
I can set up practical enquiries, including a fair test **2 lessons** Can a magnet attract objects through other materials? Put paperclip under the material -	**I can summarise findings, linking back to the investigation** *Metals are good electrical conductors especially copper, iron and steel.* *A conductor lets electricity pass through whilst an insulator does not.*	**I can plan, and carry out a reliable and fair test ensuring the controlled variables are kept the same** *The unit of measurement for a force is Newtons.*	

paper, plastic, cardboard, fabric, foil. Move magnet over the top. Does it attract the paperclip? Extension – how can we test if all the materials are as effective as each other (put more paperclips on, which holds the most, fold the materials, what happens as they get thicker? **Vocabulary: attract, materials, effective, strength, thickness, quantity** **Red Pen Link: LP Planning and revising**	*Non-metals are generally electrical insulators.* Investigate which materials are conductors allowing electricity to pass through. Design own experiment using an electrical circuit. Have a range of materials available for the children to test: paperclip, plastic spoon, rubber band, coin, pencil, aluminium foil, key, paper, string, foil-wrapped cardboard. Write a conclusion stating which materials allowed electricity to flow. Ensure children state that these are all conductors. Finish by asking if anyone knows what we call the materials which do not let electricity pass through them: insulators. Plastic, wood, glass and rubber are good electrical insulators. That is why plastic is used to cover materials that carry electricity. **Vocabulary: conductor, insulator, metals.** **Red pen link: never put a knife in a toaster as it is metal and conducts electricity**	*Friction is a force against motion that makes it harder to move an object across a surface or slows down an object's movement due to the two surfaces rubbing against each other.* Investigate the speed and distance of objects on different surfaces using a force metre to measure, make comparisons and explain possible reasons. Look at trends and patterns in the data. **Vocabulary: force, friction, motion, Newtons**	
I can compare and describe how things move on different surfaces dependant on friction *Forces can be pushes or pulls.* *Friction is a force that acts between two surfaces or objects that are moving (or trying to move) across each other.* *Some forces require contact (friction and some do not (magnetism)* *Friction does need contact as the object will move over a surface.* *Different surfaces create different amounts of friction.* *How an object moves over a surface depends on the roughness of the surface and the object and the force between them.* Investigate using marbles on different surfaces. Children select different surfaces. Make predictions- which do you believe would create the most friction? Which do you think would create the least friction?	**I can plot results on a bar chart and interpret findings** *Select and use a range of equipment e.g. thermometer.* *Recognise common dangers and act on safety suggestions.* *Make systematic observations and take accurate temperature measurements.* *An insulator is a material which does not allow heat or electricity to easily pass through.* Mini investigations Which materials are the best insulators? Use different insulators to keep water hot – wool, fabric, foil, bubble wrap, paper, plastic, nothing. Set up investigation discussing fair test - same amount of liquid, same containers, same size wrap. Show thermometer and how to use/read. Test temperature every 10 minutes	**I can explain how mechanisms allow a smaller force to have a greater effect** *A pulley is a mechanism used for lifting heavy objects by applying a pulling force to one end of the rope attached to the load which passes over a wheel.* *A gear is a mechanism that consists of a wheel and teeth which slot together. Gears change the direction of movement and the force.* *A lever is long, rigid arm that rests on a pivot. A force is applied to part of the lever to lift the load at another point on the lever. Some objects require large forces to make them move: gears, pulleys, levers can reduce the force needed to make things move.* 1. Create a lever using pencils, lengths of wood and weights to lift objects (change position of fulcrum) 2. Create a pulley using a spool to lift objects (double pulley)	

Children test each material. Record results in a table. Was your prediction accurate? Use more or less to compare observations. Explain why/why not. Identify weaknesses in method (too much of a push on some, etc). **Vocabulary: friction, strength, surface, rough/smooth, predict**	and read thermometer. Log findings and temperature changes on a bar chart. Conclusion – The best insulators have tightly packed bonds which stop the heat escaping. **Vocabulary: insulator, thermometer, temperature, systematic, interpret** **Red pen link: understand safety: wires are covered in plastic to keep us safe, never mix water and electricity**	3. Create a gear train using construction. Turn one gear, what happens to the others (small driving large, large driving small) Discuss how the mechanisms work, compare how effective they are, justify answers. **Vocabulary: gears, pulleys, levers, mechanism, force, effort, load, pivot** **Red pen link: Where do we see these mechanisms? Scissors, bikes, flagpoles**	

Y3	Y4	Y5	Y6
Rocks		**Earth and Space**	**Evolution and Inheritance**
National Curriculum • compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter		**National Curriculum** • describe the movement of the Earth, and other planets, relative to the Sun in the solar system • describe the movement of the Moon relative to the Earth • describe the Sun, Earth and Moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	**National Curriculum** • recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution
Mary Anning found the first complete fossil of an Ichthyosaurus or 'fish-lizard'. She became famous for her fossils, many of which were shown in the British Museum.		Aristotle (Greek Philosopher) believed in the geocentric theory that the Earth was at the centre of the solar system. Copernicus (Polish Astronomer) believed in the heliocentric theory. He believed the Earth rotates and believes the moon orbits the Earth but the Earth orbits the sun like all other planets. Tim Peake (Astronaut) became the first British astronaut to go to space in over 20 years in 2015. He is a current astronaut. Neil Armstrong (Astronaut)- The first person to land and walk on the moon from the USA. Mae Jemison (Astronaut)- The first African American woman to go to space. Margaret Hamilton was a pioneer in software engineering. Her software was crucial for the safe landing of Apollo 11. **<u>NASA immersive day</u>** Introduce NASA and what they have done/do (slides) Inauguration as trainee astronaut (lanyards) Moon landing – video link	Charles Darwin developed the Theory of Natural Selection. Survival of the Fittest and in 1859 produced a book called 'On Origin of the Species'. He is a key figure in the theory of evolution. He observed that although individuals in a species shared similarities, they were not exact copies of each other; there were small differences or variations between them. He also noticed that everything in the natural world was in competition.

		Why countries wanted to go to the moon – new technology, scientific knowledge How space travel has changed over time – Margaret Hamilton PPT Space food tasting Hidden Figures Film – writing stimulus **Vocabulary: Aeronautics, satellite, administrator, celestial**	
I can compare and group rocks based on their properties *Properties of rocks make them useful for different purposes.* *Describe and group rocks based on their appearance and physical properties, giving a reason.* *Some rocks are harder than others e.g. granite which is useful for building.* *Marble is another hard rock which has a texture and colour. It is used to make wall tiles, floor tiles and statues.* *Chalk is a soft rock and wears away easily. This is used to write on blackboards.* *Sandstone and chalk let water soak through and are called permeable rocks.* *Slate does not let water soak through and is an impermeable rock. Slate can be used for roof tiles because of this.* Introduce to POW vocabulary-Allow time to connect concrete to abstract. Record observations on Pic Collage, photographing rock, noting observation using POW words. Create venn diagram- which rocks could we group together and why? Which rocks would be on the outside, why? Justify the position of each rock. **Vocabulary: rocks, granite, slate, marble, chalk, sandstone, permeable, impermeable, density, physical properties, classify, identify** **Red pen link: LP noticing**		**I can use a model to show how the Earth's rotation works using how and when.** *The Earth rotates on its axis every 24 hours and this causes day and night.* *The portion of the Earth which is facing the Sun is lit up. The places lit-up experience day-time, whilst the others are in darkness and so experience night.* Discuss why does the Sun rise and set every day? Explain: The Earth spins (rotates) on its axis once every 24 hours. One half of the Earth faces the Sun (day), the other half is in shadow (night). As it rotates, different parts of the Earth move into and out of sunlight. Model with a globe and torch: Rotate the globe slowly and ask students to spot when a particular country moves into darkness or light. Make a Day/Night Model using polystyrene ball on a skewer. Mark the UK on it and other continents. Shine the torch and rotate the model to simulate a full day. Children explain what causes day and night using scientific vocabulary. What would happen if the Earth stopped rotating? **Vocabulary: earth, rotate, rotation, axis, orbiting, day and night, tilt, distance** **Red pen link: LP imagining and making links**	**I understand that offspring can vary as a result of inherited and environmental factors** *Inheritance is the process of passing on characteristics from parents to offspring.* *Normally offspring are not identical to their parent- variation.* Sort characteristics into inherited and environmental. Add own examples. **Vocabulary: inherited, characteristics, identical, non-identical, environmental, variation**

I can use scientific facts and vocabulary to describe and explain the three forms of rocks. *Sedimentary rocks like sandstone and chalk are made from layers of broken up bits of other rock and the remains of animals and plants. Over time these are squashed together to make rock. Sedimentary rocks can crumble easily.* *Metamorphic rocks were changed by intense heat and pressure deep underground. These include slate and marble.* *Igneous rocks e.g. granite are made when molten rock or magma cools down. This can happen slowly underground or quickly when it erupts from a volcano.* Watch bbc bitesize clip https://www.bbc.co.uk/bitesize/topics/z9bbkqt/articles/zgj9r2p#zbt77yc Children to access Seesaw to read information about three rock types. Use this to complete hexagon linking activity. Starburst rock cycle **Vocabulary: rocks, sedimentary, igneous, metamorphic, granite, slate, marble, chalk, sandstone, permeable, impermeable, particles, pressure, magma, molten rock, physical properties, density, durable, sedimentary, igneous, metamorphic, compaction, cementation, sediments, magma, cooling, heating, wearing, erosion**		**I can draw and label diagrams to show the phases of the moon and explain these using scientific vocabulary** *The moon follows a cycle which includes full moon, waning phases, new moon and waxing phases. It is a continuous cycle.* *Waning means the moon appears to be getting smaller.* *Waxing means the moons appears to be getting bigger.* This is because of how much of the sunlit we can see from the earth as it orbits. Teach the phases of the moon and draw and label diagrams. Use diagrams to explain the phases to a partner. Talk like an expert. **Vocabulary: moon, waxing, waning, gibbous, crescent, phases**	**I can identify how animals have adapted to suit their environments** *Adaptation is how living things suit their environment. e.g.an African elephant lives in a large habitat and has large ears that it flaps to keep cool. A polar bear lives in a cold habitat and has thick fur to keep warm.* *Plants also adapt as well as humans e.g. cacti adapt for survival in the dessert. They have long roots which can store water for a long period of time.* *Adaptation may link to evolution- the process where over time one species develops into another.* *Evolution is the way living things have changed over time.* *If all animals of the same species die out, then they become extinct.* *Over time environments can change which can affect the animals living there. They need to change to suit their environment.* Match animals to environments – forest, desert, polar, mountains Label how they have adapted to suit the environment. **Vocabulary: camouflage, environment, survive, adaptation, predator, prey, carnivore, omnivore, herbivore, insulation** **Red pen link – world wildlife, threats to species, hunting**
I can use scientific facts and vocabulary to explain the process of fossilisation *The process where a fossil is formed is called fossilisation. After an animal dies, the soft parts of its body decompose leaving hard parts, like the skeleton, behind. This becomes buried by small particles of rock called sediment. As more layer of sediment build up on top, the sediment around the skeleton begins to compact and turn to rock. The bones*		**I can describe the movement of the earth, sun and moon in relation to each other** *Describe the Sun, Earth and Moon as approximately spherical bodies* *The moon orbits the Earth but does not have anything orbiting it. It will take 28 days (a lunar cycle) to orbit the Earth.* Use slides to discuss celestial bodies earth, moon and sun.	**I understand that animals have evolved over time** *Recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago.* Know we can get information from a variety of sources e.g. fossils. Research how humans have evolved from walking on 4 legs to 2.

then start to be dissolved by water seeping through the rock. Minerals in the water replace the bone, leaving a rock replica of the original bone, called a fossil. Watch the clip looking at how fossils are made before consolidating knowledge on PowerPoint. https://www.bbc.co.uk/bitesize/articles/z2ym2p3 Zoom in and out activity (Explorify) https://explorify.uk/en/activities/zoom-in-zoom-out/star-shaped-survivor Sequencing activity on fossilisation. Identifying what is wrong with the statements and why. **Vocabulary: decayed, matter, decompose, pressure, fossils, sediment, skeleton, dissolved, fossilisation, mould fossil, cast fossil, chemical fossil, trace fossil, compaction, cementation, sediments**		Follow instructions to create human representation of the relationship between the earth, sun and moon **Vocabulary: orbit, clockwise, anti-clockwise, lunar**	What are the advantages? Carry out tasks on 4 and 2 legs – identify and compare. **Vocabulary: adaptation, evolve, evolution** **Red pen link: RE, the creation v evolution**
I can explain the importance of Mary Anning Watch BBC teach clip about Mary Anning- https://www.bbc.co.uk/teach/class-clips-video/articles/zn7gd6f Gather information about her and key events in her life/scientific discoveries. Give option of ways in which they can present their work e.g. diary entry, double-page, comic strip, or poem. **Vocabulary: palaeontologist** **Red pen link: Would you like to be a palaeontologist? Why? Why not?** **Link Mary Anning to the school learning powers- what learning powers did she use?** **How did her discovery improve our understanding of science today?**		**I know key facts about planets in the solar system** Use weblink to research facts about the sun. Centre of Solar System Look at the geocentric and heliocentric model of the solar system Group research a planet from the solar system. Groups present their findings and order themselves in distance from sun **Vocabulary: geocentric, heliocentric, universe, solar system** **Red pen link: LP listening and empathy to others carrying out presentations**	**I understand the process of natural selection and that adaptations may lead to evolution** *Charles Darwin came up with theory of natural selection, noticing that every species in the world was competition with another. Evolution is the way living things have changed over time.* Video on natural selection and Charles Darwin. Identify how some species have adapted to survive e.g. giraffes, zebras. Investigate how a new species could be detrimental to the original species using secondary sources, e.g. grey/red squirrels. **Vocabulary: evolution, natural selection, competition, survival of the fittest, environment, extinction, adaptation, adapted, breed, inherited**
I can use scientific facts and vocabulary to explain the formation of soil		**I can compare the conditions on the moon and the earth**	**Identity limitations in my methods and use my results to justify improvements** **2 lessons**

Soil is a mixture of particles of rock, dead plants and animals, air and water. *Sandy soil is pale coloured and has large particles. These create lots of small air gaps. Water drains through them easily so it usually feels dry.* *Clay soil is usually sticky and has small particles. They contain very few air gaps and water does not drain through it easily.* *Chalky soil is a light brown soil. Water drains through it quickly.* *Peat does not contain any rock particles. It is made from very old decayed plants, and is dark, crumbly and rich in nutrients.* Draw diagram of different layers of soil and their formation. Identify different types of soil from their properties. **Vocabulary: soil, sand soil, clay soil, chalky soil, peat, permeable, impermeable, particles, nutrients, decayed, matter, decompose, pressure, drains, nutrients**		*On the moon - weaker gravity: Affects muscles and bones. Radiation: Space is filled with cosmic rays and solar radiation. No weather. No atmosphere. Temperature - +100 degrees centigrade to -150 degrees centigrade at night, Lunar dust: Sharp and clingy, it can damage equipment.* Research conditions and debate Debate - is it worth going to the moon? Should we invest in going to the moon? **Vocabulary: gravity, radiation, cosmic rays, atmosphere, lunar dust** **Red pen link: dangers – 2024 astronaut's stuck on the space station. 8 days turned into 9 months. Effects on health.**	Show the 4 different beaks and 4 main diets and predict what food each one would have eaten most easily. Children set up an investigation to simulate the different bird beaks Darwin saw on the Galapagos Islands. Select materials and foods and plan. Carry out investigation maintaining a control e.g. time. Take repeat readings and find average. Record results in a table. Plot results on a line graph. Write up investigation using Y6 headings. As a class write a collective conclusion looking at the limitations and how we could make improvements. **Vocabulary: limitations, variables, control, repeat readings, average** **Red pen link: LP imagining, making links**
I can use scientific knowledge to make a prediction Which type of soil will water pass through the fastest - sand, clay, garden soil, compost How can we test which soil is the most permeable? (ideas – plastic cup with soil in and hole in bottom. Pour in water (same amount) and time how long it takes to drain) Evidence – look at first drip or how much water is collected after 5 minutes. Write conclusion. **Vocabulary: soil, sand soil, clay soil, peat/compost, permeable, impermeable, particles** **Red pen link: soils which drain/retain water, floods, natural disasters**			