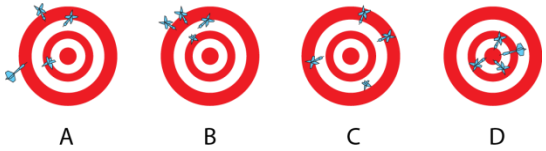
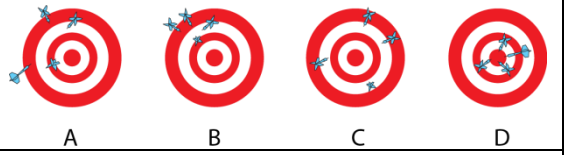
Key skills	End of KS1:	Lower KS2:	End of KS2:
Enquiry	Children should be given opportunities to lead their own lines of enquiry alongside set experiments and investigations. E.g – Plants – Which plant is living? – Given two plants (one real and other plastic) and independently select own way to test		
	• With guidance, begin to notice patterns and relationships – supported to make links. **Note:** Fair testing – not a statutory requirement in KS1	• Introducing concept of variables • **Dartboard** of precision and accuracy:  	• Using independent, dependent and control variables (please use in this order – refer to glossary) • **Dartboard** of precision and accuracy: 
Observations	• Use simple equipment to observe closely • Perform simple tests (investigation and equipment – focus is on their observations) • Supported to identify and classify materials, objects and living things based using simple features. • Using observations to suggest ideas and answers to questions • Gathering and recording data to support answering a question • Use simple scientific language to talk about what they have found out. • Communicate their findings in different ways • Some use of simple secondary sources – books, photos and videos	• Set up simple practical investigations and experiments • Make observations (accurate with standard units where possible, range of equipment) • Gather data • Record findings (drawings, labelled diagrams, keys, bar charts and tables) • Report findings (oral and written), Audience - yourself • Present findings. Audience – others. • Identify differences, similarities or changes • Using scientific evidence – secondary sources	• Plan to answer questions • Make predictions • Take accurate and precise measurements that are repeated • Record data using classification keys, tables, scatter/ line and bar graphs • Set up further tests and experiments • Present findings (conclusions, causal relationships, explanations and degree of trust) in oral and written forms. • Identifying scientific evidence – secondary sources
Asking questions	• Asking simple questions and raising their own – understanding that good scientists ask questions • Recognise that they can be answered in different ways	• Asking relevant questions *I wonder?*	• Base questions on experience with scientific phenomena • Select and plan the most appropriate way to answer these questions *I wonder?*

	I wonder?		

Key concepts that run throughout the Primary Science curriculum:	
Biology – cells *Is it living?*	• Jelly – clear jelly in a tray of sand – *is it alive because it moves?* From this, children need to understand that in order to be a living thing, there are certain features (MRS GREN). Refer to **'Teaching Tips'** document **Plants 1b** • Sponge – *absorbs water so does this make it a living thing?* • Tree – losing its leaves • Rocks and fossils
Chemistry – properties of materials *How do the properties of a material make it suitable for a specific job?*	**Common misconceptions** that can be explored though discussion and testing: • A bottle not containing a liquid is empty → allow children to experience 'wafting hands' to feel air or pushing a syringe with finger over the end. • Hard and strong are the same thing → relate to tablet/phone screens and windscreens. If you scratch glass you don't dent the material (hard) but if you hit it hard, it will break. • Anything that is solid is going to be waterproof • To be a solid, it has to be hard and unweilding
Physics	•

Science Curriculum Content

Note to teachers – the experiments noted in 'Teaching points' are only suggestions which can be adapted and mapped out in overviews to ensure that coverage of Key Skills across KS1 and 2 is broad and balanced.

There are many effective ways to get parental involvement and raise the profile of Science in schools. E.g 'Whizz Pop Bang' magazine

Year 1	Year 2	Key concepts and skills	Vocabulary		Misconceptions	Teaching points
Plants I can identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. I can identify and describe the basic structure of a variety of common flowering plants, including trees.	**Plants** I can observe and describe how seeds and bulbs grow into mature plants I can find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	• Structure of a plant • Is it a **living thing?** • Is it a flower, plant or tree?	**Year 1** common wild plants garden plants **tree -** deciduous evergreen trunk branch/ branches leaf/ leaves root **plant-** leaf root leaves bud flowers blossom petals root stem fruit bulb	**Year 2** water light suitable temperate grow healthy germination reproduction	• plants are not a living thing because they don't talk or breathe	**Teaching tips: Plants 1b** Have a range of plants for children to experience/ look after – Venus fly traps **Compare real and plastic plants** *What is the same/ different? How do we know which one is the living plant? How can you prove it?* (put both in water – observe changes over time) **Equipment**: magnifying glass **Questions:** What looks the same? What looks different? Why has one soaked up the water? Why has one changed? **Communicate findings:** Drawing pictures with labels before and after. Taking pictures and writing simple sentences e.g The

			seed			leaves are green. The other leaves are brown. Classifying – venn and carol diagram with simple features Videos – David Attenborough, National Geographic
Animals including humans I can identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals I can identify and name a variety of common animals that are carnivores, herbivores and omnivores I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) I can identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense	**Animals, including humans** I can notice that animals, including humans, have offspring which grow into adults I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air) I can describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• Are humans animals? • Do all animals lay eggs and produce milk? • Are insects animals? • Is a butterfly a bird? • Do all birds fly? • How do scientists know if they have found a new animal? How would they classify it? Year 2 only – • What do you need in order to survive?		**Refer to ' Teaching Tips' Plants 1b** • We need love to be happy but not to be alive (discussion point)	**Animal Observations** Use observations to sort and group different formats of one animal. **Secondary Sources –** same animal in different mediums (book, picture, video, drawing, cartoon, model) **Stranded!** (link to geography – habits and environment) If you were stranded on a desert island, what basic things would you need to survive? 1. Write a message in a bottle with the things humans need 2. How would the needs change if you had a pet with you?
Everyday Materials I can distinguish between an object and the material from which it is made I can identify and name a variety of everyday materials,	**Uses of everyday materials** I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic,	Constant use of the word 'property' – ensure they understand it. What is a material?		What happens if I hit the side of this cup? It will shatter because it is brittle. But what about if I turn it upside down and stand on it?	A wide range of materials – explore in as many ways as possible (senses), even some materials that look the same (e.g plastic pipe, copper pipe) Print out key property cards – create venn

including wood, plastic, glass, metal, water, and rock I can describe the simple physical properties of a variety of everyday materials I can compare and group together a variety of everyday materials on the basis of their simple physical properties.	glass, brick, rock, paper and cardboard for particular uses I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.				diagrams using hoops and children sort them. Use sentence stems to explain their choices. Design something following given properties e.g: • 2 colours Protect the egg! Applying the knowledge of material properties to design a casing to protect an egg when it is dropped from a height. Walking on egg shells - https://vimeo.com/249382991
Seasonal Changes I can observe changes across the four seasons I can observe and describe weather associated with the seasons and how day length varies.		• Does the whole world wake up at the same time? • Does the whole world have summer at the same time? • How does Santa get across the whole world in one night?		"Freak weather" that doesn't fit the pattern – does this mean the season has changed back? Global warming – humans are not responsible but we may make it happen faster	Throughout the year (as each season changes) keep a class diary – take pictures, observe the weather and take the temperature (weather gauge?) Note the clothes/ accessories we wear in each season and talk about why. Secondary sources – look at the weather reports from around the world- compare. Plot with different colour sticky notes around the world.
	All living things and their habitats I can explore and compare the differences between things that are living, dead, and things	• Could a polar bear survive in a desert? • Could we live in a cave? (history			**Is it alive?** Explore a range of objects and classify as 'Live', 'Dead' or 'Never been alive'.

	that have never been alive I can identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other I can identify and name a variety of plants and animals in their habitats, including micro-habitats I can 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.	link – MRS GREN)			**Food Chain Games (Communicating findings in different ways)** **Fox, chicken and a Sack of Grain** You have a fox, a chicken and a sack of grain. You must cross a river with only one of them at a time. If you leave the fox with the chicken he will eat it; if you leave the chicken with the grain he will eat it. How can you get all three across safely? **Present findings –** oral explanation/ diagram - arrows/ narrative/ role play – arrows. **Games** Snap, top trumps, matching pairs, snakes and ladders, rock paper scissors, true or false?

Year 3	Year 4	Key concepts	Vocabulary		Misconceptions	Teaching points
Plants I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	**Living things and their habitats** I can recognise that living things can be grouped in a variety of ways I can explore and use classification keys to help group,	**Plants:** • Explaining link between structure and function *What is this part of the plant?* *What is its job?* • Lifecycle	**Year 3** **Structure-** flowering plants roots stems leaves flowers	**Year 4** environment flowering non-flowering plants animals vertebrates (fish, amphibians,		**Teaching tips: Plants 1b** **Dyed water for plants** **Variables:** • Tulips (20 mins) vs Carnations (overnight) • Salt water, sugar water, hot and cold water, fizzy water • Different colour dyes • Stem length

I can 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 I can investigate the way in which water is transported within plants (Experiment – dyed water for plants) I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	identify and name a variety of living things in their local and wider environment I can recognise that environments can change and that this can sometimes pose dangers to living things. (Experiment – dyed water for plants - use different water types e.g salty for ocean, muddy water, rain water etc)	• How do scientists know if they have found a new animal? How would they classify it?	**Function –** nutrition support reproduction makes its own food **Requirements for life and growth-** Air Light water Nutrients (for soil) Room to grow **Life cycles –** flowers pollination seed formation seed dispersal	reptiles, birds, mammals) invertebrates (snails, slugs, worms, spiders, insects) plants		• Breeze – near fan, open window ***** A clear focus point can be chosen for this experiment e.g planning, observations, recording and explain findings. **Equipment –** plants, containers (cups with ridges!), pens, different dyes and water, stop watches. **Findings –** bar charts. **Repeat –** Provide a table of results (secondary source) to support discussion of 'degree of trust' (accuracy and precision).
Animals, including humans I can 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 I can identify that humans and some other animals have skeletons and muscles for support,	**Animals, including humans** I can describe the simple functions of the basic parts of the digestive system in humans I can identify the different types of teeth in humans and their simple functions I can construct and interpret a variety of food chains, identifying					**Stranded!** (link to geography – habits and environment) If you were stranded on a desert island, what basic things would you need to survive? 1. Message from ? with needs – who could it be for? Human? Other animal? Herbivore/ carnivore? 2. What are the commonalities? Ask questions to seek patterns and make links. 3. Explore – amount of water/ teeth type/ eyes and food chains for different animals and how this changes what they need. **Digestion** Baked beans and sausages (ring pool tin) 1. Potato masher – teeth

protection and movement.	producers, predators and prey.				2. Mix with white vinegar (stomach acid) in a sandwich bag 3. Squeeze through tights (small/ large intestine). Top half – squeeze through to get good bits out. Bottom half – squeeze out water. 4. Cut bottom of tights….poo! **Reporting/ presenting findings –** narrative or explanation.
	States of matter I can compare and group materials together, according to whether they are solids, liquids or gases I can 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) I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.				Interesting materials: toothpaste, tomato sauce, sponge, glass, sand/salt/sugar. Super-cooled water experiment: https://www.youtube.com/watch?v=Fot3m7kyLn4 Gas – spray air freshener (strong smell e.g Zoflora) with lid on and then take it on. It is a liquid but it is not the liquid that is moving but the gas travelling through the air. Paper towels- pour water onto paper towel and draw a ring around the “puddle”. Place in different areas (heat/ air) and check in every so often. Draw new ring and compare results. Fair testing.

Rocks I can compare and group together different kinds of rocks on the basis of their appearance and simple physical properties I can describe in simple terms how fossils are formed when things that have lived are trapped within rock I can recognise that soils are made from rocks and organic matter.					Explore the rocks by: • Put in vinegar (label acid rain) – any rock that fizzes is reacting and will disintegrate and crumble. • Weigh mass, put in water and weigh mass again – if it is heavier it is a sedimentary rock (water goes in-between the grains) Magic School Bus – episode Rocks and Rolls Concept Cartoons
Light I can recognise that we need light in order to see things and that dark is the absence of light I can notice that light is reflected from surfaces I can recognise that light from the sun can be dangerous and that there are ways to protect their eyes I can recognise that shadows are formed when the light from a light source is blocked by a solid object	**Sound** I can identify how sounds are made, associating some of them with something vibrating I can recognise that vibrations from sounds travel through a medium to the ear I can find patterns between the pitch of a sound and features of the object that produced it I can find patterns between the volume of a sound and the strength of the	**<u>Light</u>** • The moon is not a luminous source – reflects light rather than being a light source. • Without light, we wouldn't be able to see • How do we see things? Simple diagram to be expanded on in UKS2.		**Light -** We can see in the dark – NO! Have we truly experienced pitch black? Even at night, we always have some form of background light. Draw on experiences/ sources that show countries where all electricity is switched off at night.	**<u>Light</u>** **Video –** Brian Cox watching eclipse. Focus on how developing countries understand the dangers of the sun/light. Why can you look at it through a screen/ camera without glasses? (intensity) Polarised glasses (sunglasses) vs fashion cheap glasses. How does this link to astronaut's helmets? Do they need more or less protection than us on Earth or is it the same? https://www.youtube.com/watch?v=eOvWioz4PoQ **Shadows** – https://www.youtube.com/watch?v=XrhDN-bm0rk (Attraction Shadow BGT) – How do they get the different perspectives/ sizing and shapes? 1. Stem sentences to explain. 2. Using our scientific understanding, let's recreate this. Playground silhouettes – chalk. Predictions? Keep track throughout the day.

I can find patterns in the way that the size of shadows change.	vibrations that produced it I can recognise that sounds get fainter as the distance from the sound source increases.	**Sound** • If a tree fell down in a forest and nobody was there, would it make a noise?		Is the sun or us that moves during the day?	**Sound-** 1. Tuning forks/ strings/ rulers on edge of the table in order to feel the vibration. Grass blades? 2. Listen to music – can you identify the instruments being used? Do you notice any patterns? Does the pitch change…why? 3. Look at the 'families' (strings, clarinet, brass etc) – predict the pitch and then listen. Ext: Guitars – string thickness and number of strings – how does this alter the sound being produced?
Forces and magnets I can compare how things move on different surfaces I can notice that some forces need contact between two objects, but magnetic forces can act at a distance I can observe how magnets attract or repel each other and attract some materials and not others describe magnets as having two poles I can predict whether two magnets will attract or repel each other, depending on which poles are facing. I can compare and group together a				Cup on the table – there are no forces acting on it. So what happens if I take the table away?	**Magnetic forces:** Etch-a-Sketch, magnet under table with paper clip on top, trains and magnets (repel). Compare this with magnetic doors (secondary sources). Look at Japanese Bullet train – magnetic forces pushing the train up to make it go so fast. How are magnets used in other industries? Experiment with different strength magnets – does the size determine the strength? Explore which materials which are magnetic but are not magnets (e.g a bar magnet is magnetic and a magnet however, a paper clip is magnetic but not a magnet)

variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials					
	Electricity I can identify common appliances that run on electricity I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers I can 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 I can recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit I can recognise some common	• Where does electricity come from? What 3 sources of electricity are there? (mains powered, stored and battery power)		DON'T use terminology such as 'making' electricity (energy). Use 'generating energy'.	• Use PE to show how a circuit works – stood in circle holding hands…what happens when the circuit is broken? Game – Buzz Ball • Circuit exploration with different voltage components – what happens when we have higher voltage components? Interactive circuits: https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html • Investigate conductors and insulators using classroom resources e.g scissors, pencils both ends, coloured pencils. • Vegetables/ fruits e.g vegetable clocks, lemon batteries Transferring energy – coloured water in one beaker and then tip it into another but let some spill over….energy wastage. Link this to batteries. Guidance notes to follow – teaching tips.

	conductors and insulators, and associate metals with being good conductors.				

Year 5	Year 6	Key concepts	Vocabulary	Misconceptions	Teaching points
Living things and their habitats I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird I can describe the life process of reproduction in some plants and animals.	**Living things and their habitats** I can describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals I can give reasons for classifying plants and animals based on specific characteristics.				**Flower dissections**
Animals, including humans I can describe the changes as humans develop to old age.	**Animals, including humans** I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood I can recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function I can describe the ways in which nutrients and water			• Deoxygenated blood is **not** blue! It looks it because of the interaction of light with the veins.	**Role Play – oxygenating blood** Oxygen/ carbon dioxide cards for each child – set up heart and organs as a circuit. Children pass through the heart 'valves' and around the body. When they reach the organ, they "deposit" oxygen and walk back of carbon dioxide. **PE – exercise and heart rate** Children choose on experiement. **Findings –** line graphs

	are transported within animals, including humans.				
Properties and changes of materials I can 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 I know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution I can use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday					Afternoon experiment – choose one material per group. Go round and experiment with it in different ways: Is it soluble? Does it heat up in warm water? Does it conduct electricity? Does it respond to magnets? Is it brittle? Hard? Strong? Transparency? Does it absorb water? Define each of these properties. Give 3 uses of your material.

materials, including metals, wood and plastic I can demonstrate that dissolving, mixing and changes of state are reversible changes I can 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.					
Earth and Space I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system I can describe the movement of the Moon relative to the Earth I can describe the Sun, Earth and Moon as approximately spherical bodies I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.				The moon is the same size as the sun. No! The moon 400x smaller than the sun but is 400x closer than the sun (perspective). The moon is a star. No! Just the sun. The moon is just a large lump of rock – not a light source. When we see other planets in the sky, they look like stars.	Physical enactment of how the solar system works – planetary placements and movements. Pluto – The great debate! What is the definition of a planet? Why did Pluto no longer classify? What new data is causing a debate? Mission to Mars! Link back to previous Earth and Space topic in LKS2.

Forces I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object I can identify the effects of air resistance, water resistance and friction, that act between moving surfaces I can recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.					Brian Cox – Vacuum Chamber Gravity experiment https://www.youtube.com/watch?v=E43-CfukEgs. Show image of ball and feather before hand – predictions and why. Give children the ball and feather – will the same outcome happen in our classroom? Outside? Bolt vs Olympic Swimmer – who would win in water? Why? Research development of swimming costumes over the Olympics…how and why have they changed? (Link: properties of materials…knitted swimsuits!!). Swimming caps. Design next swimsuit – using blu-tac in water/ wallpaper paste to explore shapes cutting through. Cupcake cases experiment – different sizes, plain or coloured etc…. Fair testing. Door opening challenge – largest child in class has to try and open door by only touching the base (part that sticks out of the door!) and then get the smallest child to use 1 finger at the tip of the door handle. What happens? Why?
	Evolution and inheritance I can recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago I can recognise that living things produce offspring of	• What makes humans different from other animals?		Only a fossil if it is over 10,000 years old! True.	Only very few things have a full fossil history (fragile) Kids to bring in photos of them and their families – can you match them up? What similarities are there? Giraffes – evolution timeline.

	the same kind, but normally offspring vary and are not identical to their parents I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.				
	Light I can 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 I can 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 I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	• If we know that light travels in straight lines, why do we not see reflections on rough surfaces? • If we are in a dark room, will we be able to see?		**Light -** We can see in the dark – NO! Have we truly experienced pitch black? Even at night, we always have some form of background light. Draw on experiences/ sources that show countries where all electricity is switched off at night. Is the sun or us that moves during the day?	**Torch and Objects** Shine a light onto an object and see if it reflects. **Variables:** **Independent –** surfaces (objects) **Dependent –** does it reflect? **Control –** light source, level of lighting in the room and distance/ angle of light source. Light – coloured filters (overlays). What happens individually or when we mix colours together? Repeat some of the experiments from the previous Light unit.
	Electricity I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit I can 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				• Circuit exploration with different voltage components – what happens when we have higher voltage components? Interactive circuits: https://phet.colorado.edu/sims/html/circuit-construction-kit-dc/latest/circuit-construction-kit-dc_en.html

	I can use recognised symbols when representing a simple circuit in a diagram.				