



BARNWOOD C OF E PRIMARY SCHOOL

LEARNING AND PROGRESSION STEPS

SCIENCE

WORKING SCIENTIFICALLY SKILLS

PLAN

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
I can ask simple questions about what I see and the world around me.	Asking simple questions and recognising that they can be answered in different ways. - I can ask simple questions. - I can begin to use the resources provided to answer questions. - I can recognise that questions can be answered in different ways.		Asking relevant questions and using different types of scientific enquiries to answer them. - I can ask relevant questions. - I can answer questions posed by the teacher. - I can use resources, gathering evidence to answer a question. - I can recognise when secondary sources can be used to answer questions that cannot be answered through practical work. - I can identify the type of enquiry used to answer a question. Setting up simple practical enquiries, comparative and fair tests. - I can plan a practical enquiry. - I can carry out observations over time. - I can test to classify, identify or group. - I can seek patterns. - I can carry out comparative tests. - I can carry out fair tests. Note: A comparative test is performed by changing a variable that is qualitative e.g. the type of material, shape of the parachute. This lead to a ranked outcome. A fair test is performed by changing a variable that is quantitative e.g. the thickness of the material or the area of the canopy. This leads to establishing a causative relationship.		Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. - I can plan an observation over time enquiry to answer a scientific question, deciding what observations or measurements to make and over how long. - I can answer my own question(s) by planning my own enquiry. - I can plan a pattern seeking enquiry to answer a scientific question looking for relationships. - I can plan an identifying, classifying and grouping enquiry to answer a scientific question. - I can plan a comparative enquiry to answer a scientific question. - I can plan a fair test to answer a scientific question. - I can plan to use secondary research to answer questions which cannot be answered through practical work. - I can recognise and control variables.	

DO

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
I can observe what I see and talk about it. I can notice changes over time. I can use my ideas to investigate how and why things work.	Observing closely, using simple equipment. - I can make careful observations to support identification. - I can make careful observations to make comparisons. - I can make careful observations to notice change. - I can use simple equipment to support my observation. Performing simple tests. - I can use practical resources to gather evidence to answer questions. - I can carry out tests to classify. - I can carry out comparative tests.		Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. - I can make systematic and careful observations. - I can take accurate measurements using scientific equipment. - I can use standard units for measurement. - I can decide which equipment will give me accurate measurements.		Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. - I can take measurements using a range of scientific equipment. - I can select which equipment will give me the most precise results. - I can decide whether to take repeat readings to create a more reliable test. - I can decide whether to increase sample size to seek a pattern.	

	• I can carry out pattern seeking enquiries. • I can make observations over time. Identifying and classifying. • I can use observations and testing to compare. • I can sort and group using criteria for sorting. • I can use simple secondary sources (e.g, identification sheets) to name living things.			• I can decide whether to adjust the observation period and frequency by observing over time. • I can decide whether to check further secondary sources by researching.		
RECORD						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
I can record my observation using photos, drawing and writing.	Gathering and recording data to help in answering questions. • I can record observations using photographs or videos. • I can record observations using drawings. • I can record observations using labelled diagrams. • I can record observations in my writing. • I can record measurements using prepared tables. • I can record measurements using pictograms. • I can record measurements using tally charts. • I can record measurements using block graphs. • I can classify using simple tables. • I can classify using sorting rings.		Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • I can gather data using observations. • I can gather data using measuring equipment. • I can record data using photographs or videos which involve scientific language and explanations. • I can record using drawings and labelled diagrams. • I can record using keys. • I can record using bar charts. • I can record using tables. • I can classify data using tables. • I can classify data using Venn diagrams. • I can classify data using Carroll diagrams. • I can present the same data in a variety of ways to help answer the question.		Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • I can decide how to record and present evidence. • I can record data using scientific diagrams. • I can record data using classification keys. • I can independently record data using tables. • I can record data deciding whether to use a scatter, bar or line graph. • I can present data in a variety of ways to help answer the question.	
REVIEW						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
I can talk about what I have seen and link to simple scientific knowledge (ie it melted because the sun is out)	Using their observations and ideas to suggest answers to questions. • I can use my observations to suggest answers to scientific questions. • I can use my evidence collected to answer questions. • I can make simple judgements from my data. (Biggest, smallest, best, worst, the most, the least etc.)		Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • I can communicate my findings verbally. • I can communicate my findings in written explanations. • I can communicate my findings through displays and presentations. Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • I can draw conclusions based on evidence. • I can predict results of a similar enquiry to the one I have just investigated. • I can identify ways to adapt my method to improve my investigation. • I can ask further questions from my scientific line of enquiry. Identifying differences, similarities or changes related to simple scientific ideas and processes. • I can Interpret my data to generate simple comparative statements based on my evidence.		Using test results to make predictions to set up further comparative and fair tests. • I can make predictions based on knowledge gained from enquiry work. Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. • I can report and present findings from enquiries. • I can identify causal relationships from scientific evidence and report these in a conclusion. • I can identify results that do not fit the pattern or trend and represent this in my conclusion. • I can explain findings using subject knowledge. • I can evaluate the choice of method, control of variables, precision and accuracy of measurements and credibility of secondary sources. Teachers may reduce this depending on evaluation aim.	

		• I can identify naturally occurring patterns and causal relationships. Using straightforward scientific evidence to answer questions or to support their findings. • I can answer scientific questions based on observations I have made. • I can answer scientific questions based on data I have collected. • I can answer scientific questions based on information from secondary sources that I have collected.	• I can identify any limitations that reduce the trust they have in their data. Identifying scientific evidence that has been used to support or refute ideas or arguments. • I can discuss whether evidence supports or refutes ideas or arguments. • I can discuss how my scientific ideas change due to new evidence that has been gathered. • I can talk about how new discoveries change scientific understanding.			
BIOLOGY KNOWLEDGE						
PLANTS						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
ELG - Explore the natural world around them, making observations and drawing pictures of plants. Understand the effect of the changing seasons on the natural world around them.	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. • Identify and describe the basic structure of a variety of common flowering plants, including trees. Look at seasonal change.	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	• 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. Look at rocks for soil.	Look at living things and their habitats.	Look at living things and their habitats.	Look at living things and their habitats. Look at Evolution and Inheritance.
Notes and Guidance						
	• Explore and answer questions about plants growing in their habitat by using the local environment throughout the year. • Observe the growth of flowers and vegetables that they have planted. • Continue to name common flowers, examples of deciduous and evergreen tree, plant structure (including leaves, flowers (blossom), petals, fruit, roots, bulb, seed, trunk, branches, stem).	• Observe how different plants grow using the local environment throughout the year. • Introduce the requirements of plants for germination, growth and survival, as well as to the processes of reproduction and growth in plants. Note: Seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them.	• Introduce the relationship between structure and function: the idea that every part has a job to do. • Question the role of the roots and stem in nutrition and support, leaves for nutrition and flowers for reproduction. Note: Pupils can be introduced to the idea that plants can make their own food, but at this stage they do not need to understand how this happens.			
Working Scientifically						

	• Observing closely, perhaps using magnifying glasses. • Compare and contrast familiar plants; describing how they were able to identify and group them. • Draw diagrams to show the different plants including trees. • Record how plants have changed over time, for example the leaves falling off trees and buds opening. • Compare and contrast what they have found out about different plants.	• Observe and record, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb. • Observe similar plants at different stages of growth; setting up comparative test to show that plants need light and water to stay healthy.	• Compare the effect of different factors on plant growth, for example, the amount of light and the amount of fertiliser. • Discover how seeds are formed by observing the different stages of plant life cycles over a period of time. • Find patterns in the structure of fruits that relate to how the seeds are dispersed. • Observe how water is transported in plants, for example, by putting cut, white carnations into coloured water and observing how water travels up the stem to the flowers.			
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Vocabulary

	common wild plants garden plants tree deciduous evergreen trunk / bark branches leaf root plant leaf bud flowers blossom petal/s root stem / stalk fruit berry vegetables bulb seed	water light shade sun warm cool grow suitable temperature grow healthy germination reproduction	structure – flowering plants, roots, stem / trunk, leaves, flowers function – nutrition, support, reproduction, makes own food requirements for life and growth – air, light, water, nutrients from the soil, room to grow, fertiliser life cycle - flowers pollination, seed formation, seed dispersal photosynthesis, pollen insect / wind pollination, seed formation, seed dispersal – wind dispersal, animal dispersal, water dispersal			
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ANIMALS, INCLUDING HUMANS

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
ELG - Explore the natural world around them, making observations and drawing pictures of animals.	• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds)	• Notice that animals, including humans, have offspring which grow into adults. • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	• 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.	• 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.	• Describe the changes as humans develop to old age.	• 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. • Describe the ways in which nutrients and water are transported within animals, including humans.

	and mammals, including pets). • Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.					
Notes and Guidance						
	- Explore and answer questions about animals in their habitat by exploring the local environment throughout the year. - Show understanding of how to care of animals taken from their local environment and the need to return them safely after study. - Name common fish, amphibians, reptiles, birds and mammals, including those that are kept as pets. - Name main body parts (including head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth) through games, actions, songs and rhymes.	- Introduce the basic needs of animals for survival, as well as the importance of exercise and nutrition for humans. - Introduce the processes of reproduction and growth in animals. - Question how we recognise growth; the should not be expected to understand how reproduction occurs. The following examples might be used: egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; lamb, sheep; baby, toddler, child, teenager, adult.	Continue to learn about the importance of nutrition and should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.	- Introduce the main body parts associated with the digestive system, for example mouth, tongue, teeth, oesophagus, stomach and small and large intestine. - Explore questions that help them to understand their special functions.	- Draw a timeline to indicate stages in the growth and development of humans. - Learn about the changes experienced in puberty.	- Build on learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. - Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.
Working Scientifically						
	- Use observations to compare and contrast animals at first hand, or through videos and photographs. - Describe how to identify and group animals. This could be according to what they eat. - Identify their senses to compare different textures, sounds and smells.	- Observe, though video or first-hand observation and measurement, how different animals, including humans, grow. - Ask questions about what things animals need for survival and what humans need to stay healthy. (Suggest ways to find answers to these questions).	- Identify and group animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen in humans did not have skeletons. - Compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. - Research different food groups and how they keep us health and design meals based on what they find out.	- Compare the teeth of carnivores and herbivores, and suggest reasons for differences. - Find out what damages teeth and how to look after them. - Draw and discuss ideas about the digestive system and compare them with models or images.	- Research the gestation periods of other animals and compare them with humans. - Find out and record the length and mass of a baby as it grows.	Exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.
Vocabulary						
	parts of the body i.e. head, body, eyes, ears, mouth, teeth, leg, tail, wing, claw, fin, scales, feathers, fur, beak, paws, hooves Names of animals experienced first-	offspring grow/th adults young / old nutrition reproduce / reproduction survival water food air exercise heartbeat breathing hygiene germs disease stages	nutrition nutrients vitamins minerals fat protein carbohydrates sugars fibre water skeletons – support, protection skulls – brain ribs – heart, lungs joint muscles-	human digestive system mouth tongue-mixes, moistens, saliva teeth: incisors- cutting, slicing canines- ripping, tearing molars / premolars - chewing,	Gestation, human, development, baby, toddler, infant, child, teenager, adult, puberty, length, mass, grow, offspring	circulatory system heart blood blood-vessels pumps oxygen carbon dioxide lungs nutrients water diet exercise drugs lifestyle pulse rate transported water muscles

	hand from each vertebrate group Senses: touch, see, smell, taste, hear, fingers (skin), eyes, nose, ear and tongue Omnivore, herbivore, omnivore human head body neck arms, hands, fingers elbows legs knees face ears, eyes, nose hair mouth, tongue teeth tail fin scales feathers fur beak paw hooves senses – touch, taste, smell, hear, see	egg-chick-chicken egg-caterpillar-pupa-butterfly spawn-tadpole-frog lamb-sheep baby-toddler-child-teenageradult examples of food (pasta, bread meat, fish, fruit, vegetables)	movement, pull, contract relax	grinding oesophagus transports stomach acid enzymes small intestine large intestine rectum anus carnivore, herbivore, omnivore brush floss food chain Sun producers prey / predators hibernate		
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LIVING THINGS AND THEIR HABITATS

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
ELG - Explore the natural world around them, making observations and drawing pictures of animals and plants. Know some similarities between the natural world around them and contrasting environments drawing on their experiences and what has been read in class..	Look at plants. Look at animals, including humans.	- Explore and compare the differences between things that are living, dead and things that have never been alive. - 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. - Identify and name a variety of plants and animals in their habitats, including micro-habitats. - 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.	Look at plants. Look at animals, including humans.	- 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 sometime pose dangers to living things.	- Describe the difference 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.	- 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. - Give reasons for classifying plants and animals based on specific characteristics. Look at evolution and inheritance.

Notes and Guidance

		- Sort and classifying things according to whether they are living, dead or were never alive, and record their findings using charts. - Describe how they decided where to place things, exploring questions for example: 'Is a flame alive? Is a deciduous tree dead in winter?' and talk about ways of answering their questions. - Construct simple food chain that includes humans (e.g. grass, cow, human). - Describe the conditions in different habitats and micro-habitats (under log, on stony path, under bushes) and find out how the conditions affect the number and type(s) of plants and animals that live there.		- Using and making simple guides or keys to explore and identify local plants and animals. - Make a guide to local living things. - Raise and answer questions based on their observations of animals and what they have found out about other animals that they have researched.	- Observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. - Grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. - Observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow.	- Use classification systems and keys to identify some animals and plants in the immediate environment. - Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.
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Vocabulary

		living dead never been alive suited / suitable habitats micro-habitats basic needs food food chain sun-grass-cow-human alive healthy logs leaf litter stony path under bushes shelter seashore woodland ocean rainforest conditions hot / warm / cold dry / damp / wet bright / shade / dark		environment flowering non-flowering plants animals vertebrate danger invertebrates- snails, slugs, worms, spiders, insects vertebrates- fish, amphibians, reptiles, birds, mammals plants – flowering plants, non-flowering plants population development litter deforestation classification, / classification keys environment / habitat - human impact, positive, negative migrate	life process of reproductionplants animals vegetable garden flower border reproduction plants-sexual, asexual animals-sexual life cycles- mammal, amphibian, insect, bird rainforest, oceans, desert prehistoric similarities differences germination pollination stamen stigma life cycle reproduce sperm fertilises egg live young metamorphosis plantlets runners bulbs cuttings	organism micro-organism fungus mushrooms classification keys environment fish amphibians reptiles birds mammals vertebrates invertebrates insects, spiders snails, worms flowering and nonflowering
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EVOLUTION AND INHERITANCE

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	Look at plants. Look at animals including humans.	Look at plants. Look at animals including humans. Look at living things and their habitats.	Look at plants. Look at animals including humans. Look at rocks.	Look at animals including humans. Look at living things and their habitats.	Look at animals including humans. Look at living things and their habitats.	- Recognise that living things have changes 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 adaption may lead to evolution.
Notes and Guidance						
						• Build of what they learned about fossils in the topic on rocks in year 3, find out more about how living things on earth have changed over time. • Introduce the idea that characteristics are passed from parents to their offspring, for instance, by considering the different breeds of dogs, and what happens when, for example, Labradors are crossed with poodles. • Appreciate the variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes' necks got longer, or the development of insulating fur on the arctic fox. • Find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. Note: At this stage, pupils are not expected to understand how genes and chromosomes work.
Working Scientifically						
						• Observe and raise questions about local animals and how they are adapted to their environment. • Compare how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels.

						Analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.
Vocabulary						
						evolution suited / suitable adapted / adaptation offspring characteristics vary / variation inherit / inheritance fossils sexual reproduction environment natural selection
CHEMISTRY KNOWLEDGE						
MATERIALS						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	Everyday materials: - Distinguish between an object and the material from which it is made. - Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. - Describe the simple physical properties of a variety of everyday materials. - Compare and group together a variety of everyday materials on the basis of their simple physical properties.	Use of everyday materials: - Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboards for particular uses. - Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Rocks: - 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.	States of matter: - 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.	Properties and changes of materials: - 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	Look at evolution and inheritance – fossils.

					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.	
Notes and Guidance						
	Explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. Explore and experiment with a wide variety of materials, not only those listed in programme of study, but including for example: brick, paper, fabrics, elastic, foil.	- Identify and discuss the uses of different everyday materials in order to become familiar with how some materials are used for more than one thing (metal can be used for coins, cans, cars and table legs; wood can be used for matches, floors, and telegraph poles) or different materials are used for the same things (spoon can be made from plastic, wood, metal, but not normally from glass). - Think about the properties of materials that make them suitable or unsuitable for particular purposes and they should be encouraged to think about unusual and creative uses for everyday materials. - Find out about people who have developed useful new materials, for example John Dunlop, Charles Macintosh or John McAdam.	Linked with work in geography, pupils should explore different kinds of rocks and soils, including those in the local environment.	- Explore a variety of everyday materials and develop simple descriptions of states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). - Observe water as a solid, a liquid and a gas and not the changes to water when it is heated or cooled. Note: Avoid using materials where heating is associated with chemical change, for example, through baking or burning.	- Build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. - Explore reversible changes, including evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. - Explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. - Find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.	
Working Scientifically						
	Perform simple tests to explore questions, for example: 'What is the best material for an umbrella?... for lining a dog basket?... for curtains? ... for a bookshelf? ... for a gymnast's leotard?	- Compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs). - Observe closely, identifying and classifying the uses of different materials, and recording their observations.	- Observe rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time. - Use a hand lens or microscope to help them identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them. - Research and discuss the different kinds of living things whose fossils are found in	- Group and classify a variety of different materials; exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party). - Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. - Observe and record evaporation over a period of		

			sedimentary rock and explore how fossils are formed. - Explore different soils and identify similarities and differences between them and investigate what happens when rocks are rubbed together or what changes occur when they are in water. - Raise and answer questions about the way soils are formed.	time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting.		
Vocabulary						
	object material wood plastic glass metal water rock brick clay properties hard / soft stretchy stiff shiny dull rough / smooth bendy / stiff waterproof absorbent paper fabrics elastic foil card / cardboard floppy	names of materials – increase the range from Y1 properties of materials – as Y1 plus: opaque transparent translucent reflective non reflective flexible rigid shape push / pushing pull / pulling twist / twisting squash / squashing bend / bending stretch / stretching	rock stone pebble boulder soil layers hard / soft fossil grains crystals hard/ soft texture absorb water marble chalk granite sandstone slate sandy soil clay soil chalky soil peat	solid liquid gas air oxygen powder grain / granular crystals ice / water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius solidify molten boil state change melting, freezing, melting point, boiling point, evaporation, temperature, water cycle	solid liquid gas air oxygen powder grain/ granular crystals ice/ water/ steam water vapour heated/ heating cooled/ cooling temperature degrees Celsius melt freeze solidify melting point molten boil	
PHYSICS KNOWLEDGE						
EARTH IN SPACE						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
The Natural World ELG - Understand the effect of the changing seasons on the natural world around them. Observe seasonal change at Forest School or during outdoor play. Use calendar linked with seasons and weather daily. Seasonal display for FS and associated vocabulary.	Seasonal changes: - Observe changes across the four seasons. - Observe and describe weather associated with the seasons and how day length varies.	See plants - specifically how plants need water, light and a suitable temperature to grow and stay healthy.	See plants – specifically the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow). See rocks – specifically WS what happens when rocks are in water. See Light	See plants – specifically to recognise that environments can change and that this can sometimes pose dangers to living things. See states of matter – specifically to identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	Earth and Space: - 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.	See evolution and inheritance. See light.
Notes and Guidance						
	Pupils should observe and talk about changes in the weather and seasons. Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.				- Analyse a model of the Sun and Earth that enables them to explain day and night. - Learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus,	

					Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a dwarf planet in 2006). • Understand that the moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). Note: Pupils should be warned not to look directly at the Sun, even when wearing dark glasses. • Find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus.	
Working Scientifically						
	• Make tables and charts about the weather. • Make displays of what happens in the world around them, including day length, as the seasons change.				• Compare the time of day at different places on the Earth through internet links and direct communication. • Create simple models of the solar system. • Construct simple shadow clocks and sundials; calibrated to show midday and the start and end of the school day. • Find out why some people think that structures such as Stonehenge might have been used as astronomical clocks.	
Vocabulary						
	season spring summer autumn winter weather hot / warm cool / cold sun / sunny cloud / cloudy wind / windy rain/ rainy snow / snowing hail / hailing sleet frost fog / mist ice / icy rainbow thunder lightning storm light / dark day / night day length				Earth planets Sun solar system Moon celestial body sphere / spherical rotate / rotation spin night and day star planets Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto 'dwarf' planet orbit revolve geocentric model heliocentric model shadow clocks sundials astronomical clocks	
LIGHT						

EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	See seasonal changes.	See plants.	• 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. See plants.	See Electricity.	See Earth and Space.	• 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.
Notes and Guidance						
			• Explore what happens when light reflects off a mirror or other reflective surface, including playing mirror games to help them answer questions about how light behaves. • Think about why it is important to protect their eyes from bright lights. • Look for and measure shadows, and find out how they are formed about what might cause the shadows to change. Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.			• Build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.
Working Scientifically						
			• Look at patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.			• Decide where to place rear-view mirrors on cars, or design and make a periscope using the idea that light travels in straight lines to explain how it works. • Investigate the relationship between light sources, objects and shadows by using shadow puppets. • extend their experience of light by looking at a range of

						phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).
Vocabulary						
			light light-source see dark absence of light reflect reflective surface natural star Sun Moon artificial torch candle lamp translucent transparent opaque shiny matt surface shadow reflect mirror sunlight dangerous			light travels straight reflect reflection light source object shadows mirrors periscope rainbow filters straight lines light rays
ELECTRICITY						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	See everyday materials.	See uses of everyday materials.		- Identify common appliances that run on electricity. - Construct a simple series electrical circuit, identifying and naming its basic part, 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.	See properties and changes of everyday materials.	- 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.
Notes and Guidance						
				- Construct simple series circuits, trying different components, for example bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. - Draw the circuit as a pictorial representation, not necessarily using conventional		Building on their work in year 4, construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors.

				circuit symbols at this stage; these will be introduced in year 6. Note: Pupils may use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity.		- Learn how to represent a simple circuit in a diagram using recognised symbols. Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.
Working Scientifically						
				Observe patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.		- Systematically identifying the effect of changing one component at a time in a circuit. - Design and make a set of traffic lights, a burglar alarm or some other useful circuit.
Vocabulary						
				appliances electricity device electrical circuit cell wire bulb buzzer danger electrical safety sign insulators switch open closed components motor mains / plug circuit complete circuit connect battery / positive / negative connections loose connection short circuit clip motor connector metal / non-metal		appliances electrical circuit complete circuit, circuit diagram circuit symbol components cell / battery positive/ negative terminal connection loose connection short circuit wire crocodile clip bulb brightness switch buzzer volume motor conductor insulator voltage current resistance danger series circuit symbol
SOUND						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	See Animals, including humans – specifically identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. See Everyday materials – when teaching sound in Y4, you may want to refer to sound going through different mediums.	See Uses of everyday materials - when teaching sound in Y4, you may want to refer to sound going through different mediums.	See Light	- 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 strength of the vibrations that produced it.	Look at Animals, including humans.	See Light – specifically how light travels and then compare to sound.

				• Recognise that sounds get fainter as the distance from the sound source increases.		
Notes and Guidance						
				• Explore and identify the way sound is made through vibration in a range of different musical instruments from around the world. • Find out how the pitch and volume of sounds can be changed in a variety of ways.		
Working Scientifically						
				• Finding patterns in the sounds that are made by different objects such as saucepan lids of different sizes or elastic bands or different thicknesses. • Make earmuffs from a variety of materials to investigate which provides the best insulation against sound, • Play their own instruments by using what they have found out about pitch and volume.		
Vocabulary						
				sound source noise vibrate vibration travel solid liquid gas pitch (high/low) tune high low volume loud quiet fainter muffle vibrations insulation instrument percussion strings brass woodwind tuned instrument		
FORCES AND MAGNETS						
EYFS	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
	See Everyday materials.	See uses of everyday materials.	• 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		• 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	

			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.		smaller force to have a greater effect.	
Notes and Guidance						
			• Observe that magnetic forces can act without direct contact, unlike most forces, where direct contact is necessary (for example, opening a door, pushing a swing). • Explore the behaviour and everyday uses of different magnets (for example, bar, ring, button, horseshoe)		• Explore falling objects and raise questions about the effects of air resistance. • Explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. • Experience forces that make things begin to move, get faster or slow down. • Explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. • Explore the effects of levers, pulleys and simple machines on movement. • Find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.	
Working Scientifically						
			• Compare how different things move and group them. • Raise questions and carry out tests to find out how far things move on different surfaces and gather and record data to find answers to questions. • Explore strengths of different magnets and find a fair way to compare them. • Sort materials into those that are magnetic and those that are not. • Look for patterns in the way that magnets behave in		• Explore falling paper cones or cup-cake cases, and design and make a variety of parachutes, carrying out fair tests to determine which designs are the most effective. • Explore resistance in water by making and testing boats of different shapes. • Design and make products that use levers, pulleys, gears and/or springs and explore their effects.	

			relation to each other and what might affect this, for example, the strength of the magnet or which pole faces another. Identify how these properties make magnets useful in everyday items and suggest creative uses for different magnets.			
Vocabulary						
			Force magnetic force magnetic strength bar magnet ring magnet button magnet horseshoe magnet push pull twist contact non-contact open surface magnet magnetic attract repel magnetic poles north pole south pole metal iron steel		fall gravity force Earth air resistance water resistance friction moving surfaces mechanisms levers pulleys gears magnetic force magnet attract simple machines	