Science Curriculum Progression Map

ENGAGEMENT – RESILIENCE - INTEGRITY

Working scientifically

Year group	Key skills and 'sticky' knowledge	Key vocabulary
Year 1	Working scientifically • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions Know that we can ask questions about the world and that when we observe the world to answer these questions, this is scienceSet up a test to see eg Is your arm span the same size as your height? Do plant's grow bigger if watered with milk, coke or water? Seed race which will grow fastest: lentils, black beans, pop corn, split peas or chick peas? Know of the text has been successful and say what they have learned Know that we can use magnifying glasses to observe objects - minibeasts, plants and trees Know that we can use measures (within Y1 mathematical limits) to help find out more about the investigations undertaken Know that we can write down numbers and words or draw pictures to record what we find With help, observe changes over time eg seed race, watering a plant with different liquidsBegin to use scientific language With help, record and communicate findings in a range of waysUse simple equipment to make measurements	properties, observe, test, magnifying glass, object, record, equipment, why, findout

Year 2	Working scientifically • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science Know that we can use equipment such as thermometers and rain gauges to help observe changes to local environment as the year progresses Use microscopes to find out about small creatures and plantsKnow that we can test our questions to see if they are true Know how to set up a fair test and do so when finding out about how seeds grow best Classify or group things according to a given criteria, e.g. deciduous and coniferous trees Know that we can write down numbers and words or draw pictures to record what we find Use measures (within Year 2 mathematical limits) to help find out more about the investigations they are engaged withMake observations and comparisons using simple equipment, following simple instructions Skills Record data Use simple measurements and equipment to gather dataCarry out simple tests. Talk about what we have found out and how we have found it	**Continued from Y1** properties, observe, test, magnifying glass, object, record, equipment, measure, check, fair test, predict, thermometer, temperature
Year 3	**Working scientifically** • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	prediction, measurement, enquiry, dependent variable, independent variable, fair test,

	• reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • use straightforward scientific evidence to answer questions or to support their findings.Know that we can ask questions and answer them by setting up scientific enquiries Know how to make relevant predictions that will be tested in a scientific enquiry Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same Know how to use a range of equipment to measure accurately Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list ofequipment, a numbered method, a detailing of results and a conclusion Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry Know that scientific enquiries can suggest relationships, but that they do <u>not</u> prove whether a prediction is true Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)Know that they can draw conclusions from the findings of other scientists <u>Skills</u> Raise relevant questions about the world around them. Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help decide how to set it up.Talk about criteria for grouping, sorting and classifying; and use simple keys. Make systematic and careful observations. Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. Begin to look for naturally occurring patterns and relationships and decide what data to collect and identify them. Take accurate measurements using standard units Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simpleconclusions and answer questions. Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions.	similar, theory, hypothesis

Year 4	Working scientifically • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • use straightforward scientific evidence to answer questions or to support their findings.Know that we can ask questions and answer them by setting up scientific enquiries Know how to make relevant predictions that will be tested in a scientific enquiry Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table	Ongoing from Year 3 prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis
	Know how – with structured guidance - to write a simple scientific enquiry write-up including an introduction, a list ofequipment, a numbered method, a detailing of results and a conclusion Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended todifferent contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)Know that they can draw conclusions from the findings of other scientists Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is anexplanation that has not yet been tested, but that can be tested through a scientific enquiry Skills Raise their own relevant questions about the world around them. Should be given a range of a scientific experiences including different types of science enquiries to answer questions. Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions.Set up simple practical enquiries, comparative and fair tests. Recognise when a simple fair test is necessary and help decide how to set it up.Talk about criteria for grouping, sorting and classifying; and use simple keys. Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Make systematic and careful observations. Help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. Begin to look for naturally occurring patterns and relationships and decide what data to collect and identify them. Take accurate measurements using standard units Learn how to use a range of (new) equipment, such as data loggers / thermometers appropriately. Collect and record data from their own observations and measurements in a variety of ways: notes, bar charts and tables, standard units, drawings, labelled diagrams, keys and help to make decisions about how to analyse data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simpleconclusions	

	and answer questions. Use relevant simple scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences, including oral and written explanations, displays or presentations of results and conclusions. With support, they should identify new questions arising from the data, making predications for new values within or beyond the data they have collected and finding ways of improving what they have already done.	
Year 5	**Working scientifically** • planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments. Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth) Know how to identify conditions that were imperfectly controlled and can explain how these might affect results Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis measurement Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, anumbered method, a detailing of results and a conclusion Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil recordsas evidence of natural selection).	Continue from year 3 and 4 and line graph, relationship, outlier

Year 6	• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, andbar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments. • Explore and talk about their ideas; asking their own questions about scientific phenomena; and analysing functions,relationships and interactions more systematically • Draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientificknowledge and understanding to explain their findings. Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuringeffect of light on plant growth) Know how to identify conditions that were imperfectly controlled and can explain how these might affect results Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize andremove outliers from a set of data, justifying the removal as a potential mis-measurement Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, anumbered method, a detailing of results and a conclusion Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil recordsas evidence of natural selection)	line graph, relationship, outlier,prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis	

Year group	**Key skills and 'sticky' knowledge (including working scientifically)**	**Key vocabulary**

Year 1	**Animals including humans** BIG IDEAS • 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 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 witheach sense. Know names of some minibeasts found in school grounds eg woodlouse, spider, ladybird, slug, worm Know that a trout is an example of fish, a frog is an example of an amphibian; a lizard is an example of a reptile; arobin is an example of a bird; a rabbit, a tiger, a meerkat and a human are examples of a mammal Know that herbivorous animals eat plants; a carnivorous animal eats other animals; omnivorous animals eat both animalsa plants Know that a tiger is an example of a carnivore; that a rabbit is an example of a herbivore; know that many humans are examples of omnivores (though not vegetarians) Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons; these are known as vertebrates, which means they are animals that have a backbone Know that fish are different in having gills so that they can breathe underwater **and** scaly skin Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on landKnow that reptiles are different in that they breath air **and** have scaly skin Know that birds are different to other animals in that they have feathers and wings Know that mammals are different to other animals in that they have fur/hair **and** they feed milk to their young Know that feet, legs, arms, hands, head, skin, ears, eyes, nose, mouth, skull, torso and tongue are part so the body andidentify them Know the five senses are touch, smell hear, see, taste Know which body part is associated with each sense eg that eyes are associated with sight, ears with sound, nose withsmell, tongue with taste and skin with touch. **Plants** BIG IDEAS • 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 treesKnow a rose bush, a sunflower and a dandelion by sight Know an oak tree, a silver birch tree, a willow and a horse chestnut tree by sight Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves inautumn Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk	Senses (touch, see, taste, hear, smell), growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, torso, ears, nose, mouth, hands, feet, head, skull, tongue growth, deciduous, evergreen, flower, plant, tree, branch, roots, stem, leaf, trunk,, bulb petal, fruit, seed
Year 2	**Living things and their habitats** BIG IDEAS • explore and compare the differences between things that are living, dead, and things that have never beenalive	birth, living, once lived, never alive, dead decay, energy, microhabitat, life

	• identify that most living things live in habitats to which they are suited and describe how different habitatsprovide 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 microhabitats • 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. Know that living things move, grow, consume nutrients and reproduce; that dead things used to do these things, but no longer do; and that things that never lived have never done these things. Know that animals are adapted to their environments I.e. thickness of skin and texture of skin.Know that plants are adapted to their environment Know that woodland, wetland and grassland are examples of micro-habitats Know that animals live in micro-habitats. Know that plants absorb energy from the Sun; that this energy is consumed by herbivorous animals; and that carnivorous animals eat other animals. Know that this is a food chain. Know that the arrows on a food chain show the direction that the energy travels. <u>Skills</u> Apply compare, sort and group animals based on classification knowledge.Record and communicate our findings using scientific language. Use observations to discuss and answer questions. Create a food chain showing an understanding of the arrows etc. **<u>Animals, including humans</u>** <u>BIG IDEAS</u> • 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.Know that animals, including humans, need food, water and air to survive Know that animals, including humans, are born from their mother and grow into adult animals.(offspring)Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables Know that fats and sugary foods should be eaten rarely and in small amountsKnow that people need to exercise often to help their body stay strong and fit Know that keeping clean, including washing and brushing teeth, is an important part of staying healthy **<u>Plants</u>** <u>BIG IDEAS</u> • observe an 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 Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under theright conditions (water, warmth) Know that plants absorb energy from the sun and that plants deprived of light, food or air will not grow and will die.Know that plants reproduce to make new plants. Know that cacti and pine trees are examples of plants adapted to their environment – thick skin keeps a store of water safe; sharp spikes keep animals from stealing the water, pine trees have thick bark and pine cones to protect against cold winters Skills Communicate using scientific language what they have observed over timeUnderstand the changes that are taking place over time Use a thermometer to measure temperature and find when plants grow best.	cycle, food chain, source, nutrients, producer, consumer environment, adapt oxygen, conditions for life, air, rest, water, exercise, life cycle, reproduction, offspring, adult, , hygiene, exercise, young growth, carbohydrate, protein, fat, vitamins bulb, seed, temperature, drought, nutrients, conditions

Year 3	**Animals including humans BIG IDEAS** • identify that animals, including humans, need the right types and amount of nutrition, and that they cannot maketheir 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 Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth) Know that getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet Know that lack of a nutrient can cause ill health Know that excess of a food group can cause ill health, such as tooth decay due to excess sugar Know that animals, including humans, have a skeleton made up of solid objects. Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton Know that skeletons provide support for muscles and protect the body; for example, the ribcage protects the vital organs in the human body Know that human skeletons are made up of bones and cartilage Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens **Plants BIG IDEAS** • 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) andhow 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 seeddispersal. Know that different parts of plants have one or more functions (jobs) Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits; know that the stem also transports water and minerals from the roots tothe other parts of the plant Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water intocarbohydrates Skills -See Working Scientifically	vitamins and , minerals balanced diet, calcium, cartilage, invertebrate, contract, loosen, ribcage, insect, skeleton, muscles, nutrition, protection, protein, carbohydrate, sugars Roots, stem, leaves, flower, bud, growth, blossom, petals, fruit, vegetables, bulb, seed, pollination, water, light, formation, dispersal, germination, reproduction, nutrition, nutrients, air, soil, fruit, nectar, petal, pollen,stigma, stamen, function, exchange, dispersal, fertilization

Year 4	**Animals, including humans BIG IDEAS** • 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 function • construct and interpret a variety of food chains, identifying producers, predators and prey. Know that food passes through the body with the nutrients being extracted and the waste products excreted, and thatthis process is called digestion Know that the process of digestion involves breaking complex food stuffs into simpler building blocks that can be absorbedby the body Know that the process of digestion begins with food being chewed in the mouth by the teeth and saliva added Know that a human has three types of teeth – incisors, canines and molars – and that these each perform differentfunctions Know that incisors slice food, canines tear food (especially meat) and that molars grind food Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12Know that food is squeezed down the oesophagus towards the stomach in a wave-like action called peristalsis Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; anorgan is a part of living thing that is self-contained and has a specific important job Know that further enzymes and bile break down the food further as it moves through the duodenum towards the smallintestine Know that the small intestine adds more enzymes and then absorbs the nutrientsKnow that the large intestine absorbs water from the undigested food Know that undigested food is stored in the rectum before being excreted through a muscle called the anusKnow that a food chain traces the path of energy through a habitat Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants, which are called producers Know that consumers take in energy by eating Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called apredator Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumerand above it is called a tertiary consumer Know that the arrows in a food chain show the direction that energy is travelling through a habitat **Living things and their habitats BIG IDEAS** • 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 Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and basedon their behaviour (e.g. herbivores, carnivores and omnivores) Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celledorganisms Know that a species is a group of living things have many similarities that can reproduce together produce offspringKnow that a classification key uses questions to sort and identify different living things Know how to use a classification key to identify living things Know how to create a classification key to sort plants on the school premises Know that changes to the environment can make it more difficult for animals to survive and reproduce; in extreme casesthis leads to extinction, where an entire species dies Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence Know that the polar bear is a famous example of climate change endangering the existence of a species.	digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid,bile, enzymes, incisors, canines, molars, predator, prey, producer, consumer, primary, secondary, tertiary kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution

Year 5	**Animals, including humans BIG IDEAS** • describe the changes as humans develop to old age. Know that humans go through stages of development; they begin as fertilized eggs and then develop into embryos before developing into babies; once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently. **Living things and their habitats BIG IDEAS** • describe the differences in the life cycle of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals ora seed in many plants Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fedon milk before it is weaned onto the food that is adapted to eat; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again Know that in amphibians (e.g. frogs) a fertilized egg develops into an embryo and then hatches into a tadpole; the tadpole develops adult characteristics, metamorphoses into the adult form after which it can reproduce and the cycle canbegin again Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupametamorphoses into the adult butterfly after which it can reproduce and the cycle can begin again Know that in birds (e.g. robins) a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is readyto fly (i.e. becomes a fledgling); it then leaves the nest and grows into an adult after which it can reproduce and the cycle can begin again. Skills • Observations • Identifying scientific evidence that has been used to support or refute ideas or arguments.	life cycle, life span, embryo, womb, weaned, adolescence. Metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect
Year 6	**Living things and their habitats BIG IDEAS** • describe how living things are classified into broad groups according to common observable characteristics andbased on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics. • Should classify animals into commonly found invertebrates (Arachnids, molluscs, insects) and vertebrates (fish,amphibians, birds, reptiles and mammals) Know that there are three types of micro-organism: viruses, fungi and bacteria; of these three, viruses are often not really considered to be alive by many scientists mainly because they don't have the 'machinery' to reproduce inside themKnow that germs are disease-causing bacteria Know that an arthropod is an invertebrate with a hard, external skeleton and jointed limbs Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; mostinsects also have a pair of antennae and a pair of wings Know that an arachnid (e.g. spider) is a type of arthropod with eight legs and no antennae or wingsKnow that a crustacean is a type of arthropod with two pairs of antennae (e.g. woodlouse) Know that a myriapod is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)Know the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification **Animals, including humans BIG IDEAS** • identify and name the main parts of the human circulatory system, and describe the functions of the heart, bloodvessels 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 humansKnow that the heart and lungs are organs protected by the ribcage Know that blood travels around the body transporting nutrients that have been absorbed into the blood stream from digestion; blood also	micro-organism, virus, thorax, arthropod, abdomen,arachnid, antenna, jointed limbs artery, aorta, atrium, blood vessels capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, body

	carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration Know that the heart beats, pumping blood around the body and that blood vessels carry the blood; arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in thebody and most major arteries branch off from it Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can bereplenished; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates Know that drugs are chemicals that have an impact on the natural chemicals in a person's; know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overusedKnow that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller Know that cannabis and cocaine are examples of illegal drugs that can have serious negative effects Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects,such as liver disease and lung disease, respectively **Evolution and inheritance BIG IDEAS** • recognise that living things have changed over time and that fossils provide information about living things thatinhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identicalto their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptationmay lead to evolution. Know that all life on Earth began from a single point around 4.5 billion years ago Know that living things changes over time and that this gradual change is called evolution Know that natural selection is the cause of this change; natural selection works as across a species there is natural variation within a species; there is also competition to survive and reproduce and that members of a species with advantageous characteristics survive and reproduce - these characteristics are passed down to their offspring; members of a species with less advantageous characteristics do not survive and reproduce – these characteristics are **not** passed downto offspring Know that offspring vary and are not identical to their parents Know that Charles Darwin posited this theory of evolution by natural selection Know that the gradual change of species over millions of years can be observed by looking at examples of fossil Find out about the work of palaeontologists such as Mary Anning and bout how Charles Darwin and Alfred Wallacedeveloped their ideas on evolution	evolution, natural selection, variation, advantageous

Year group	Key skills and 'sticky' knowledge (including working scientifically)	Key vocabulary
Year 1	**Everyday materials BIG IDEAS** • 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 rockdescribe 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 Know from observation how to distinguish between materials made of wood, plastic, glass, metal, water, rock Know that an object is made from/of a material Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material Compare and group together a variety of everyday materials on the basis of their physical properties	absorb, property, wood, plastic, glass, metal, water, rock man-made, natural, hard, strong, rough, bendy, solid, smooth, light, soft, transparent waterproof
Year 2	**Uses of everyday materials BIG IDEAS** • identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock,paper and cardboard for different uses • compare how things move on different surfaces. • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching • Know that materials can have useful properties for a given job (including being waterproof, strong, hard, soft, flexible, rigid,light or heavy.) Know that many types of plastic are waterproof, that steel (a type of metal) is strong, that rock is hard, that cotton wool is soft, that rubber is flexible, that rock is rigid, that polystyrene (a type of plastic) is light and that iron (a type of metal) is heavy, Know that when objects move across a surface there is friction when they rub against each other and that sometimes thisfriction is larger or smaller Know that applying forces to objects can change their shape Skills Apply knowledge to sort materials by their properties Understand and explain why materials are used for a purpose	Revise Year 1 and …brick, paper, cardboard, friction, movement, suitable, surface, stretch, twist, waterproof, flexible, rigid, absorb, force
Year 3	**Rocks BIG IDEAS** • 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. Know that there are three kinds of rocks: igneous, sedimentary and metamorphic Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath Know types of igneous rock and that igneous rocks form from molten rock below the Earth's crust Know types of sedimentary rock which form when small, weathered fragments of rock or shell settle and stick together, often inlayers	extinction, igneous, metamorphic, sedimentary, archaeologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil, durable

	Know types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other Know that fossils form when a plant or animal dies and is quickly covered with silt or mud so that it cannot be rotted by microbes or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone aroundthe dead plant or animal; the materials in the body are replaced by minerals that flow in water through the rock, leaving a rock in the shape of the animal or plant that was once there Know that soil is made from tiny particles of rock broken down by the action of weather (weathering) Skills -See Working Scientifically	
Year 4	**States of matter BIG IDEAS** • 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. Know that things are composed of a material in one of three states of matter: solid, liquid or gas Know that things are made of particles (tiny building blocks) and that these are organized differently in different statesKnow that materials can change state when temperature changes Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature,the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensationKnow that when a solid turns into a gas without passing through the liquid state, this is called sublimation Know that the melting point of water is 0^{O} C and that the boiling point of water is 100^{O} CKnow that water flows around our world in a continuous process called the water cycle Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation Know that water flows across the land in rivers and streams in a process called surface run-off and under the ground as groundwater	bond, condensation, evaporation, reversible, boiling point, melting point, liquid, gas, thermometer, water cycle, continuous precipitation, surfacerun off process, sublimation absorption, dissolving, energy, evaporation, freezing, matter, melting, particle, temperature, ice, water, solid, atoms, degrees celsius.
Year 6		

Year 1		
Year 2		

Year 3	**Light BIG IDEAS** • recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surface • 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 a solid object • find patterns in the way that the size of shadows change. Know that light is a form of energy Know that energy comes in different forms Know that we need light to see things and that darkness is the absence of lightKnow that light travels in straight lines Know that light is reflected when it travels from a light source and then 'bounces' off an object Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the SunKnow that many light sources give off light and heat Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage theeyes Know that opaque objects block light creating shadows and that light passes through transparent objectsKnow that opacity/transparency and reflectiveness are properties of a material Know that as objects move towards a light source, the size of the shadow increasesKnow how to show the changing of shadow size **Forces and magnets BIG IDEAS** • compare how things move on different surfaces • notice that some forces need contact between 2 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, andidentify some magnetic materials • describe magnets as having 2 poles • predict whether 2 magnets will attract or repel each other, depending on which poles are facing.Know that a force can be thought of as a push or a pull Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves Know that there are also non-contact forces that can act between objects without them touching and that magnetism is anexample of a non-contact force Know that magnets have two poles called north and south Know that like poles (south-south and north-north) of two magnets repel each other and that opposite poles of two magnets(north-south) attract each other Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic Skills -See Working Scientifically	mirror, image, beam, solid, opaque, transparent, object, source, opaque, transparent, translucent, reflection, dark, light source, shadow,solid, straight, natural, artificial, travels, shortest, longest, highest, lowest, shape, change, block metal, material, surface, friction, force magnetic, non-magnetic, pole, north, south, forces, repel, attract, magnets

Year 4	**Sound BIG IDEAS** • 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 Know that sound is generated when an object vibrates; some of the energy from the vibrating object is transferred to the air,making the air particles move Know that energy comes in different forms and can be neither created nor destroyed, only changed from one form to another Know that sound is a form of energy that transfers in a longitudinal wave - like that seen in a slinky - not a transverse wave -like that seen in water ripples Know that sound travels through a medium (e.g. particles in the air) and thus sounds does not travel through a vacuum whichhas no particles in it at all Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear Know that sound travels at different speeds through different objects; it travels at around 340 metres per second in air, muchslower than light travels; this is why we often hear thunder after we see lightning as the light reaches our eye before the sound reaches our ears Know that pitch is how high or low a sound is and that this is determined by how many vibrations per second are being made bythe vibrating object; the number of vibrations per second is called frequency Know that volume is how loud or quiet a sound is and that this is determined by the amount of energy in the wave (e.g. fromhow hard or soft a percussion instrument is hit) Know that the volume of a sound is quieter if the listener is further away from the object Know the anatomy of an ear and how it relates to the hearing of sound. **Electricity BIG IDEAS** • 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 acomplete 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 simpleseries circuit • recognise some common conductors and insulators, and associate metals with being good conductorsKnow that electrical energy is one of many forms of energy Know that current electricity is the flow of charged particles called electrons around a circuit Know that electrical current flows well through some materials, called electrical conductors, and poorly through other materials, called electrical insulators Know that conductors have free electrons and that when electrical current flows around a conductor the electrons move Know that electrical conductivity (how well a material conducts electricity) is an example of a property Know that metals are good electrical conductors Know that water is a good, yet dangerous electrical conductor. Know that more than one cell lined up to work together is called a battery Know that electrical current can flow if there is a complete circuit Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit Know that insulators are important for safety reasons when working with electricity. Know that when electrical current flows through a circuit components within that circuit – such as buzzers which make a noiseand bulbs which emit light – begin to work Know that a switch functions by completing or breaking a complete circuitKnow how to construct a simple circuit using components Know that exposure to high levels of electrical current can be dangerous	absorption, conductor, energy, insulator, wave particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume,pitch, transverse wave, longitudinal wave, medium, vacuum component, conductor, energy, insulator, particle, property, material circuit, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, chemical reaction, emit

Year 5	**Forces BIG IDEAS** • explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and thefalling object • identify the effects of air resistance, water resistance and friction, that act between moving surface • recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move Know that pull forces can be measured using a device called a force meterKnow that the amount of matter (stuff) in an object is its mass Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together Know that unsupported objects are pulled towards the Earth by the force of gravity Know that air resistance is a force felt by an object as it moves through the air; it is caused by the object bumping into the gasparticles that make up air; the quicker an object moves, the more gas particles it bumps into and the more air resistance it experiences Know that a falling object will accelerate until its air resistance matches the gravitational force pulling it down; at this point, the object will continue to move at this speed (called its terminal velocity) without getting any quicker or slowing down Know that a parachute's shape increases the air resistance that a falling object experiences, giving it a much lower terminal velocity Know that water resistance is a force felt by an object as it moves through water; it is caused by the object bumping into thewater particles Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as streamlined Know how to draw a force diagram with arrows representing the different forces acting on an objectKnow that a lever is a rigid length pivoting around a fulcrum Know that a pulley is a wheel with a fulcrum that supports a moving cable or belt Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns anadjacent gear in the opposite direction Know that gears, levers and pulleys are simple machines that used to allow a smaller force to have a greater effect; they do this by moving a smaller force over a longer distance at one end of the machine, which the machine turns into a larger forcerover a small distance at the other end. Skills • Use their science experiences to explore ideas and raise different kinds of questions. • Talk about how scientific ideas have developed over time. • To set up fair tests and explain which variables need to be controlled and why • Look for different casual relationships in their data and identify evidence that refuses or supports their ideas.	energy, matter, particle, surface, friction, force, stretch, squash, rotation, rough, smooth, sliding friction, static friction acceleration, air resistance, buoyancy,effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid,streamlined, terminal velocity, unsupported, water resistance, weight

Year 6	**Light BIG IDEAS** - 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 intothe 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 Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction;this happens because light travels at different speeds in different media. Know that white light comprises all the colours of light Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; thisarray of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds. Know how to draw a diagram to show why the shape of a shadow will match the shape of an object Know that when light reflects off an object, the angle of incidence is equal to the angle of reflection Know that a periscope takes advantage of the predictable angles of incidence and reflection to allow an image to be shown to aviewer (working scientifically to design and make a periscope) **Electricity BIG IDEAS** - 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 ofbuzzers and the on/off position of switches - use recognised symbols when representing a simple circuit in a diagram. Know that voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, **not** the size of the electric current Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer) Know how to draw simple circuit diagrams including using the scientific symbolsKnow the recognized symbols for a battery, bulb, motor, buzzer and wire Know how to predict whether components will function in a given circuit, depending on whether or not the circuit is complete; whether or not a switch is in an on or off position; and whether or not there is a cell to provide electrical current to the circuitKnow that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of usingparallel circuits (e.g. in the lighting in homes)	absorption, energy, property, reflection, wave, mirror, incident ray, image, beam, photons (Tier 3), solid, opaque, transparent, object, source, angle of incidence, angle of reflection, refraction, spectrum, translucent, medium, periscope circuit, component, conductor, energy, insulator, particle, property, material, appliance, charge, electron, battery, cell, bulb, buzzer, switch, wire, current electricity, static electricity, negative terminal, positive terminal, voltage, chemical reaction, emit series circuit, parallel circuit, resistance, voltage

Year group	**Key skills and 'sticky' knowledge (including working scientifically)**	**Key vocabulary**

Year 1	**Seasonal changes BIG IDEAS** • observe changes across the 4 seasons • observe and describe weather associated with the seasons and how day length varies. Know that days are longer in the summer and shorter in winter Know that weather changes through the year, getting hotter in the summer and colder in the winterKnow that the winter is likely to bring ice on the ground when water freezes due to the cold Know the four seasons and key changes that occur. Observe and describe weather associated with the seasons and how the day length varies	freezing, melting, , clouds, wind, snow, ice, spring, summer, autumn, winter, temperature, weather, season Autumn, Spring, Summer, Autumn
Year 2		
Year 3	**Light BIG IDEAS** Light is a form of energy We need light to see things and that darkness is the absence of light Light travels in straight lines Everything that we can see is either a light source or something that is reflecting light from a light source into our eyesThe Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun **Rocks and fossils BIG IDEAS** Know that there are three kinds of rocks: igneous, sedimentary and metamorphic Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath Know types of metamorphic rock which form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other Skills -See Working Scientifically	mirror, image, beam, solid, opaque, transparent, object, source, opaque, transparent, translucent, reflection, dark, light source, shadow, solid, straight, natural, artificial, travels, shortest, longest, highest, lowest, shape, change, block extinction, igneous, metamorphic, sedimentary, archaeologist, weathering, molten rock, crust, tectonic plates, scavengers, fossil, durable
Year 4		

Year 5	**Earth and space BIG IDEAS** • 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.Know that the universe comprises all matter and space in existence Know that a celestial body is a large object in the universe Know that a star is an exceptionally hot ball of gas, originally made from hydrogen and heliumKnow that the Sun is a star Know that a planet (e.g Earth) is defined as a spherical celestial body that orbits a star and that has cleared the neighbourhood of its orbit of other objects, some of which crash into the planet and others that become moons of that planet Know it was once thought that everything orbited the Earth, but that scientists like Copernicus and Galileo used telescopes and measurement to show that the Earth orbited the Sun Know that there are eight major planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, NeptuneKnow that the universe is utterly vast and that our solar system makes up a tiny fraction of the universe Know that a satellite orbits a planet and that moons are natural satellitesKnow that the Moon orbits the Earth roughly every 28 days Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses Know that humans have sent man-made satellites into orbit that assist with telecommunication Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer theirorbit Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit Know that night and day are the result of the Earth rotating on its axis Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons asduring winter the light is spread over a wider area Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunareclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon Skills • Research led. • Identify scientific evidence that has been used to support or refute ideas and arguments.	planet, satellite, sphere, solar system, eclipse, star, universe, constellation, axis, celestial body, Moon, rotating, lunar, solar, telescope, rotation
Year 6		