St. Andrew's C of E Primary School
Science Curriculum Framework

Scientific Big Ideas *('motorways' of conceptual understanding)*
Big Ideas of Science

		Years 1 and 2	Years 3 and 4	Years 5 and 6
	All matter in the Universe is made of very small particles.	**MATERIALS** Everything is made from something else.	**ROCKS & LIGHT** Soils are formed from broken down rocks and other things. **FORCES & MAGNETS** Everything is made of small particles call atoms. The internal structure of an atom determines whether it is a metal or a non-metal. Some metals have magnetic properties. Iron is the most frequently found magnetic metal, though there are others. A magnetic material will have magnetic poles. Surfaces are different because of the things they are made from. **PLANTS & ANIMALS** Each part of a plant (e.g. leaf) is made of cells. There are different sorts of cells within parts of plants. **MATERIALS** Everything is made of something else. Some things join together to make something different. Everything takes up space on the earth. Everything has a mass.	**ELECTRICITY & LIGHT** Electrical currents flow when small parts of atoms called electrons pass between them. **ANIMALS** Cells in our bodies are made of water and other nutrients. **STATES OF MATTER** All substances are made of small parts called atoms. When atoms join together they form molecules. At room temperature, some substances are in the solid state, some the liquid state and some are in a gaseous state. The state of many substances can be changed by heating or cooling them. The amount of matter does not change when it is heated or cooled. **FORCES & MATERIALS** There are three states of matter: solid, liquid and gas. The things substances are made from mean they look different and have different characteristics. Some substances combine with others. Sometimes these mixtures can be separated out to obtain the original substances that were mixed together. Sometimes their structure changes permanently to become a new and different substance. The tiny molecules in air can have an effect on the way big things move **LIVING THINGS** The cells in our bodies are made of different things. **SOUND & ELECTRICITY** When sound waves travel through the air, the air molecules move. Some substances have atoms that can pass electrical charge from one atom to another.

	Objects can affect other objects at a distance.	**PLANTS & SEASONS** Weather patterns are caused by things happening all around the world. The sun's light causes things to grow even though the sun isn't touching them.	**ROCKS & LIGHT** Light illuminates objects at a distance. Light travels in straight lines. Objects in the light's path can affect its behaviour (reflection, shadows, and colours). Shadows are modifications to the patterns of light reaching something. **FORCES & MAGNETS** Some metals are magnetic. Magnets attract metals that are magnetic. Magnets don't need to be touching an object to exert a force. When an object is dropped it falls to the floor because it is being influenced by gravitational force. **PLANTS & ANIMALS** Plants' growth is affected by their proximity to light and heat sources. **MATERIALS** Every substance has a mass. The mass of the earth pulls things towards it. Objects can be changed when forces are applied.	**ELECTRICITY & LIGHT** Light energy travels in straight lines. We can see things that we cannot touch. We can only see things because light travels from light sources to our eyes. **STATES OF MATTER** The sun's heat energy travels in invisible waves. The sun doesn't need to be touching something to warm it up. **EARTH & SPACE** The objects in the solar system affect each other because they all have gravitational forces which interact with each other. The temperature of the planets in our solar system is affected by the sun. **FORCES & MATERIALS** Gravitational force pulls things towards the earth. **SOUND & ELECTRICITY** Sound is made when things vibrate. The sound energy travels in waves through the air, making the air vibrate as it carries the sound. The further away a sound is, the fainter the sound will be.
	Changing the movement of an object requires a net force to be acting on it.		**FORCES & MAGNETS** Things move when a force is directly applied. The movement of an object can change when external forces act on it. When surfaces touch they exert forces on each other. When one force is bigger than another they are not balanced. The speed (motion) of a moving object is changed depending on the forces acting on it and the object's mass. Magnets make some things move because they have a magnetic force that you can't see and doesn't have to be touching an object. **MATERIALS** Force, speed and friction affect the way things move. A force can change the direction of something or twist it or make its shape change. If two things push against each other with the same force they cancel each other out because they are in balance.	**ELECTRICITY & LIGHT** Light can be reflected off most surfaces. As light waves travel through some objects, the objects' composition or shape can change the way the light waves travel (refraction). **STATES OF MATTER** When things are heated up they are given more energy. When molecules have more energy they warm up. When they are warm enough to be a gas they can move around much faster. **EARTH & SPACE** The movement of the moon around the earth is affected by the gravitational force of the earth. **FORCES & MATERIALS** An object's motion is changed by forces acting on it. The amount of change of motion depends on the object's mass and the amount of force applied. The greater the mass of an object, the longer it takes to speed up or slow down. Friction is caused when a moving object is in contact with a surface: the surface resists the movement of the object. Friction can be caused by large particles like stones or small particles like air molecules. **SOUND & ELECTRICITY** Sound is a form of energy which makes air molecules vibrations
	The total amount of energy in the Universe is always the same but can be transferred from one energy store to	**MATERIALS** Recycling is a good way to conserve energy and resources. **ANIMALS** All food starts off being plants. Some animals eat plants. Some animals eat plants as well as other animals. Some animals eat other animals. **PLANTS & SEASONS** Wind energy can make things move.	**ROCKS & LIGHT** Light is a type of energy. It is known as a renewable energy source because it does not run out. Some organisms decay to produce other materials which can be used as energy sources (short term: compost. Long term: coal, oil). Fossil fuels are non-renewable energy sources. **FORCES & MAGNETS** When an object moves, energy is transferred from somewhere else into the object. When an object slows down, the moving (kinetic)	**ELECTRICITY & LIGHT** Electrical energy can be stored in batteries. Voltage is the amount of force available to drive an electric current. When there is more electrical energy in a circuit it has a bigger impact on the actions that take place in the circuit. **STATES OF MATTER** When something is warmed up energy is transferred to it from the heat source. Some of the heat energy can also become light energy. **EARTH & SPACE**

	another during an event.		energy it has is transferred into other sorts of energy (heat, light etc.). When friction occurs surfaces get hot because some of the moving energy becomes heat energy. **PLANTS & ANIMALS** The sun supplies energy to plants which is transferred to animals. The sun's light gives energy to plants. Plants store the energy from the sun inside their cells. Plant energy is renewable energy. **MATERIALS** When we push something to make it move we are transferring energy from one thing to another. We use heat energy to make things change when we cook them. Recycling is a good way to conserve energy and resources.	Wind energy is a renewable energy source. Waves can also be used to provide energy. **FORCES & MATERIALS** When something is moving is has kinetic energy. It slows because its kinetic energy is converted to heat and light energy caused by friction (this can be air and water resistance as well as surface friction). Pulleys and levers allow a small force to have a greater effect. **LIVING THINGS** All living things get energy from the sun directly or indirectly. When organisms die the energy stored in their cells can be used by other organisms **ANIMALS** Energy for life comes from the sun. Animals get that energy through eating plants which have harvested the sun's energy. **SOUND & ELECTRICITY** When you hit a drum the energy is transferred from your arm onto the skin of the drum where it forms sound waves. Electrical energy can be made by converting the sun's energy. The sun's energy is stored in plants. Plants and decayed plants (peat, coal) can be burned to produce electrical energy. Electrical energy can be converted to heat or light or sound energy.
	The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.	**ANIMALS** Animals need to live at a particular temperature so not all places are OK for them to live in. **PLANTS & SEASONS** Weather patterns are caused by things happening in other places. Our weather changes because of the earth's angle relative to the sun. We can measure what is happening with the weather and notice seasonal patterns.	**ROCKS & LIGHT** Most of our earth is covered with a layer of soil with rock underneath. Some rocks are formed through volcanic action. Wind and rain break down rocks into small particles which become soil. **FORCES & MAGNETS** The earth's core produces magnetism, the effects of which can be detected everywhere (compasses). **PLANTS & ANIMALS** The earth's soil contains air, water, chemicals from the decay of living things and living bacteria. All of these contribute towards healthy plant growth. **PLANTS & LIVING THINGS** Long term weather patterns are called climate. Climate and weather affect the way things can live. The earth is covered with soil which is where most plants grow. The soil contains bacteria which helps things decay. Some places cannot sustain life because their climate is too extreme. Not all things can survive in the same place.	**EVOLUTION** Fossils are made when soft tissues decay and are compressed. They are compressed when they are buried by successive layers of soil (which may become rock over time). **STATES OF MATTER** The different states of matter of water are all vital for our survival on the earth. 2/3 of the earth is covered by liquid water which is essential to life. Water is constantly recycled through processes involving evaporation from oceans and other surfaces, condensation in clouds and precipitation as rain, snow or ice. The temperature and movement of water vapour in the air affects our weather. Measuring the patterns of water vapour movement enables us to predict the weather. Long term patterns in the weather are referred to as climate. **EARTH & SPACE** The angle of the earth to the sun affects the temperature, climate and weather in different parts of the earth. There is air all around our planet but less and less further away from its surface. **FORCES & MATERIALS** Gravitational force helps keep our earth's atmosphere stable. **LIVING THINGS** The bacteria in the earth's soil help to break down living things as they decay. These decayed organisms introduce chemicals into the soil which plants need to grow.
	Our solar system is a very small part of one of billions of galaxies in the Universe.	**PLANTS & SEASONS** There are patterns of the sun seen at different times of the day and patterns of the shape of the moon from one night to another. Some parts of the year have different weather patterns to other parts of the year.	**ROCKS & LIGHT** The sun is a star which is the main source of light in our solar system. **FORCES & MAGNETS** Gravitational force is affected by the mass of a planet. The larger the mass of the planet, the greater the gravitational force is. **PLANTS & ANIMALS** The earth's angle relative to the sun affects the climate of a place. **PLANTS & LIVING THINGS**	**STATES OF MATTER** Animals need water to survive. Water at the temperature we need it to survive is only found in any quantity on earth. **EARTH & SPACE** The sun is the only star in our solar system. It is the primary source of heat and light in our solar system. Our earth is one of several planets in the solar system. We can see the other planets in our solar system at night when the sun's light is reflected off them. We can also see stars and planets from other solar systems.

			The sun's position relative to the earth affects the climate of a place. Plants grow better in the summer when there is more sun and the days are longer.	The earth moves around the sun. The earth spins on its axis as it rotates which causes day and night. The moon orbits the earth and reflects light from the sun onto the earth. **FORCES & MATERIALS** Every star and every planet has its own gravitational force. The larger the mass of the planet, the greater the gravitational force is. **LIVING THINGS** The sun's position relative to the earth affects the climate of a place. The earth's angle relative to the sun affects the climate of a place **ANIMALS** The sun's position relative to the earth affects the climate of a place.
	Organisms are organised on a cellular basis and have a finite life span.	**ANIMALS** Animals can move and have babies and can react to things. Animals need light, air, nutrition and water to survive. **PLANTS & SEASONS** Inside plants there are different parts that have jobs to do to help the plant survive	**ROCKS & LIGHT** Some rocks are made from things that were once alive. Creatures' bodies that lived long ago can be found fossilised in rocks. **PLANTS & ANIMALS** The sun's energy is key to providing many of the things animals need to grow. Animals have different body parts and structures that enable them to perform functions that they need to survive. Plants have specialised parts that provide different functions. Within leaves and cells, they have cells whose function is to use light to convert water and carbon dioxide into food. There are also cells whose function is to transport water, and some cells whose function is to convert gasses. Plants have an internal circulation system which allows the transfer of water and nutrients within parts of a plant. Plants also have specific parts that are designed to help the plant reproduce. **ANIMALS** **PLANTS & LIVING THINGS** Living things die. Dead things decay and nourish new life. Plants and animals have different parts that perform different functions to enable them to thrive. Each living organism has its own life cycle.	**ELECTRICITY & LIGHT** The cells in our bodies which absorb light are in our eyes. We see things when light waves enter our eyes. Strong light can cause the cells in our eyes to break down. **ANIMALS** All body parts are made of cells which do different things. Cells in our bodies are made of water and other microscopic structures. The cells need to be fed by particular nutrients to enable them to work properly. Blood carries nutrients and air around the body. **EVOLUTION** Life spans are similar within family groups of living things but can vary widely. When some living things die they are preserved in the earth as fossils. **LIVING THINGS** Organisms have particular physical characteristics that enable them to survive and thrive. All living things die. Some living things have longer life spans than others. Animal's body parts are made of cells which are constantly being renewed by their bodies.
	Organisms require a supply of energy and materials for which they often depend on, or compete with, other organisms.	**ANIMALS** Animals need food, air, water and certain temperature conditions to thrive. **PLANTS & SEASONS** Sunny seasons are when things grow best in our country.	**ROCKS & LIGHT** We have cells that react to light in our eyes. **PLANTS & ANIMALS** Animals have nutritional needs to sustain life, which are supplied by other organisms. Plants need water, air and light to survive. Some plants depend on other organisms to enable them to be pollinated properly or for seed dispersal. **ANIMALS** **PLANTS & LIVING THINGS** The sun gives living things energy.	**ANIMALS** The circulatory system contains parts that work together to transport nutrients, air and water around the body. Health and lifespan is affected by the things animals eat and drink. **EVOLUTION** Ways of getting energy and materials for life are similar within different classes of living things. **LIVING THINGS** Organisms need others to survive. If one organism can't survive, its demise can affect the survival of other organisms. If one organism dominates an environment it can use up resources that other organisms need to thrive. Most living things rely on

			Different living things get energy and nourishment in different ways. Dead and decaying organisms provide energy and nourishment for living things. Living things have requirements to enable them to live and thrive. Plants with green leaves can make food from the sun and store it to use later. Animals are dependent on plants and sometimes on other animals for survival – either for food or for shelter	other organisms, dead or alive, to get energy and survive. Cells need to obtain the correct nutrients to survive properly. **ANIMALS** Most animals have some sort of digestive system which enables them to process food into energy. Animals need food that they can break down to release energy. This food comes from plants directly (herbivores) or by eating animals (carnivores) which have eaten plants or other animals. These can be described as food chains.
	Genetic information is passed down from one generation of organisms to another.	**ANIMALS** Offspring are similar to their parents. **PLANTS & SEASONS** Plants need food, air, water and certain temperature conditions to grow. Plants can make food from the sun	**PLANTS & ANIMALS** Many animals have structures that provide the ability for them to obtain what they need. These structures are very similar within species. Plants can be grouped together into plant families that have similar characteristics. Plants with similar characteristics often live in similar habitats and have similar features. **ANIMALS** Living things inherit the characteristics of their species	**ANIMALS** Our ability to make the right choices about being healthy have to be learned, they are not inherited. **EVOLUTION** Living things have physical characteristic that make them similar or different to each other. These characteristics are the same within families. Living things can be classified into groups according to their characteristics Living things produce offspring of the same kind but the offspring are not always identical to their parents. **LIVING THINGS** Living things can be classified into family groups. These groups often have similar identifiable features. The mature offspring of organisms is the same as its parent but juveniles can be very different to their parents. Living things live in different ways. Plants and animals have specific parts that are for reproduction. Different classes of animals and plants reproduce in different ways. Animal's families reproduce in the same way from generation to generation. **ANIMALS** Humans all have the same digestive system. Some animals have particular physical characteristics (eg teeth) enable them to eat particular things. **SOUND & ELECTRICITY** Our ears convert sound waves reaching them into nerve signals that our brain interprets as sound.
	The diversity of organisms, living and extinct, is the result of evolution.	**ANIMALS** Different things live in different places. Some plants and animals are extinct. **PLANTS & SEASONS** Plants from a particular family of plants have similar features. Plants reproduce and their offspring have many things in common with the parent.	**PLANTS & ANIMALS** Different animals have adapted to live in their habitats and environments. Animal families have similar body structures and are likely to live in similar places. Plants have evolved to live in different habitats by adapting some of the ways they survive. Some of their features or the way they interact with other organisms are specialised to help them adapt to particular environments. **ANIMALS PLANTS & LIVING THINGS** Some living things have adapted to obtain nourishment in special ways because of where they live. Some species could not survive in the places they lived and have become extinct. Living things die if their environment does not provide them with the essentials they require. We can group types of	**EVOLUTION** External factors can affect the life span of different living things. Living things have changed over time. Plants and animals adapt to their environment in different ways. Over time these adaptations lead to the evolution of different species. **LIVING THINGS** Sometimes features of organisms change to enable them to survive. If the organisms cannot adapt to new environments they may die out. Different types of living things are born and grow in different ways. The places where things live affects the ways they can survive. Reproduction cycles differ in time and in manner between different species even within animal classes. **ANIMALS** Animals have developed particular body shapes (e.g. teeth) to enable them to survive in different environments

			animals and plants together because they have similar characteristics	
	Science is about finding the cause or cause of phenomena in the natural world.	**MATERIALS** Some materials are better than others to do a particular job. **ANIMALS** Scientists can explain ways in which humans have changed habitats. **PLANTS & SEASONS** Not all plants are the same.	**ROCKS & LIGHT** We measure light in units called lumens. Science can explain how fossilised creatures can be found in rocks. **FORCES & MAGNETS** We measure forces in units called Newtons. **PLANTS & ANIMALS** Science can explain through observation how animals' body structures are adapted to different environments. Scientists help us to understand the function of different parts of plants and this helps us to understand their diversity. **MATERIALS** Scientists can use what they know about forces and materials to describe how things move. Some materials are better than others to do a particular job. **ANIMALS** Science can explain diversity. Science helps us to understand factors affecting healthy living and existence. **PLANTS & LIVING THINGS** Scientists can explain why habitats and their occupants are diverse,	**EVOLUTION** Observations of fossils enables scientists to describe ways in which living things have changed over time. **STATES OF MATTER** Ice can float in water so when it's cold creatures can still survive in water at the bottom of oceans and lakes where the water is not frozen. **LIVING THINGS** Careful observations over time enable scientists to understand and describe the different ways that living things live and survive.
	Scientific explanations, theories and models are those that best fit the evidence available at a particular time.	**MATERIALS,ANIMALS.PLANTS & SEASONS** We can all ask questions about what is happening in our world and we can do something to find answers to the questions to explain what is happening.	**ROCKS & LIGHT, FORCES & MAGNETS** **PLANTS & ANIMALS** Scientists work out answers to questions through careful collection of data, observation and measuring. Scientists can only get the right answers if they have collected the correct data in the correct way and this is usually guided by having a theory about an answer that they want to test out. **MATERIALS** **ANIMALS PLANTS & LIVING THINGS** We can all ask questions about what is happening in our world and we can do something to find answers to the questions to explain what is happening. **PLANTS & LIVING THINGS** Today we know we have to look after habitats and ecosystems but 100 years ago people did not. We use seed banks and animal sanctuaries to stop some species dying out.	**ANIMALS** **EVOLUTION** **STATES OF MATTER** **EARTH & SPACE** **FORCES & MATERIALS** **LIVING THINGS** **ANIMALS** **SOUND & ELECTRICITY** Scientists work out answers to questions through careful collection of data, observation and measuring. Scientists can only get the right answers if they have collected the correct data in the correct way and this is usually guided by having a theory about an answer that they want to test out. **EVOLUTION** As scientists are able to use DNA to link species together they understand more about how species have diversified over time. **FORCES & MATERIALS** Theories about how the planets move and affect each other have changed over time as ways technology has improved to help scientists observe what is happening better.

	The knowledge produced by science is used in engineering and technologies to create products to serve human ends.	**MATERIALS** Scientists have invented ways of making materials from other materials e.g. glass, plastic **PLANTS & SEASONS** Meteorologists have computers that measure weather patterns. This helps them to make weather forecasts.	**ROCKS & LIGHT** Sunglasses and sunscreen protect us from the damaging effects of sunlight by changing the way the light reaches our skin or eyes. Scientists have helped us to use fossil fuels in different ways with increasing efficiency. **FORCES & MAGNETS** We use magnets to induce currents in generators. We use electricity and magnetism to produce motion in motors. We also use magnets to help with sorting rubbish and recycling. Our knowledge of forces and friction helps us to make things safer (tyre treads, shoe sole treads, brakes). Sometimes, removing friction makes things more energy efficient (racing slick tyres). **PLANTS & ANIMALS** We have been able to develop new varieties of food plants to maximise their food they can produce or to help them be cultivated in different places. **MATERIALS** Transportation is affected by what scientists know about moving things efficiently. We can alter the way things move to make them safer. Scientists have invented ways of making materials from other materials e.g. glass, plastic **ANIMALS** We use wearable health monitors to help us know how healthy we are and whether we are doing enough exercise. **PLANTS & LIVING THINGS** We can create artificial habitats (farms) so that things grow more abundantly than they would the wild and we can use them for our food.	**STATES OF MATTER** Some thermostats work when parts inside them expand as they get warmer and shrink as they get colder to open and close switches inside circuits. **FORCES & MATERIALS** As scientists find different ways of combining substances they create new substances that we can use in different ways. For example, 100 years ago there were few plastics in the world. **ANIMALS** Scientists have supported doctors by developing ways of seeing and monitoring what happens inside our bodies, to keep us healthy. We can wear devices that help us monitor the amount we move and keep healthy. **SOUND & ELECTRICITY** Scientists have helped develop hearing aids which can pick up sound waves and amplify them for people who cannot hear well naturally. Electricity has transformed the way we live today because we can have light and heat whenever and wherever we need it.
	Applications of science often have ethical, social, economic and political implications.	**MATERIALS** Learning to identify and separate materials is important so that they can be recycled and reused. **ANIMALS** Sometimes the things humans do change the ways other living things can live	**ROCKS & LIGHT** Sources of fossilised energy are finite and using them affects our world's environment. When we burn fossil fuels for energy it creates pollution. **PLANTS & ANIMALS** Sometimes when plant species have been introduced to new locations they become invasive and have no predators (Japanese knot weed, Himalayan balsam) **PLANTS & LIVING THINGS** Conservation helps us to keep habitats safe so things can live there.	**STATES OF MATTER** Many industries require water for heating, cooling, hydrating and cleaning products. In some parts of the world there is competition for water between people and industries. Our changing climate means that weather patterns are more erratic so some people have too much water and some people not enough. **FORCES & MATERIALS** Irreversible changes to substances mean it's hard to recycle materials and re-use their component parts. **LIVING THINGS** We can help or hinder the way organisms thrive by creating or destroying the habitats they live in. Habitats can change more quickly than the species that live in them. Changing habitats can cause animal and plant species to die out. **ANIMALS** Changing diets mean our bodies have easier access to more energy but some forms of energy e.g. sugar are bad for us (tooth decay). **SOUND & ELECTRICITY**

				Objects can block sound waves – earplugs. We are using up many non-renewable resources to make electrical energy and this is using up our planet's resources.

EYFS

Science Big Ideas and Threshold Concepts

Curriculum designers take account of big ideas and pertinent threshold concepts to plan a coherent, 'spiral' curriculum for Science which secures mastery and progression in conceptual understanding and builds knowledge from 'novice' to 'expert'.
Teachers take account of big ideas and related threshold concepts in their Science planning for Science lessons to secure mastery of subject knowledge, year on year and over time.

EYFS Framework: Understanding the World
Pupils should be guided to make sense of their physical world and their community through opportunities to explore, observe and find out about people, places, technology and the environment.
People and communities: children talk about past and present events in their own lives and in the lives of family members. They know that other children don't always enjoy the same things and are sensitive to this. They know about similarities and differences between themselves and others, and among families, communities and traditions.
The world: children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Technology: children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.

EYFS Development Matters: Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.

Early Learning Goal : The Natural World

Children at the expected level of development will:

- ✓ Explore the natural world around them, making observations and drawing pictures of animals and plants
- ✓ Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class
- ✓ Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter

KS1

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Key Skills: procedural knowledge/domain specific skills
Know how to:

Working Scientifically:

- Ask simple questions and recognise that they can be answered in different ways
- Observe closely, using simple equipment
- Perform simple tests
- Identify and classify
- Use their observations and ideas to suggest answers to questions
- Gather and record data to help in answering questions

Enquiry Logos will be used to signpost:

Year 1 Key Knowledge - know about:	Year 2 Key Knowledge – know about:
Theme 1A **Animals including humans** **Are all animals the same?** ♣ 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)	**Theme 1B** **Uses of Everyday Materials** **Why are there different materials?** ♣ Describe the simple physical properties of a variety of everyday materials ♣ Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for different uses;

- ♣ Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense

Theme 4A

Uses of Everyday Materials What materials can you find in your home?

- ♣ 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
- ♣ Compare and group together a variety of everyday materials on the basis of their simple physical properties

Theme 7A

Plants and Seasonal Changes How does your garden grow?

- ♣ 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
- ♣ Observe changes across the 4 seasons

(+Geography 3A and 6A)

Observe and describe weather associated with the seasons and how day length varies **(+Geography 3A and 6A)**

- ♣ Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

Theme 4B

Animals including humans What do animals need to survive?

- ♣ 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.

Theme 7B

Plants and Living things and their habitats Where do living things grow?

- ♣ 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.
- ♣ 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 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.

Years 3 and 4

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Key Skills: procedural knowledge/domain specific skill: know how to:

Working Scientifically:

- Ask relevant questions and using different types of scientific enquiries to answer them.
- Set up simple practical enquiries, comparative and fair tests.
- Make systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
- Gather, record, classify and present data in a variety of ways to help in answering questions.
- Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
- Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
- Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
- Identify differences, similarities or changes related to simple scientific ideas and processes.
- Use straightforward scientific evidence to answer questions or to support their findings.

Enquiry Logos will be used to signpost:

Y3 Key Knowledge - know about:	Y4 Key Knowledge – know about:
Theme 1A **Rocks How are different rocks formed?** ♣ 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 **Theme 1A** **Light What makes a shadow?** ♣ 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 light source is blocked by a solid object ♣ Find patterns in the way that the size of shadows change **Theme 4A** **Forces and Magnets How does a magnetic force work?** ♣ 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, and identify 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 **Theme 7A**	**Theme 1B** **Sound How do we hear?** ♣ 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 **Theme 4B** **Electricity What can electricity do?** ♣ Identify common appliances that run on electricity ♣ Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers ♣ Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery ♣ Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit ♣ Recognise some common conductors and insulators, and associate metals with being good conductors **(+ Design Technology 2A)** **Theme 7B** **Animals including humans How do animals grow and eat?** ♣ 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

Plants and Animals including humans Do all life cycles look the same? ♣ 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 ♣ Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird ♣ Describe the life process of reproduction in some plants and animals. ♣ Describe the changes as humans develop to old age.	♣ 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.

Years 5 and 6

Science Big Ideas and Threshold Concepts

Curriculum designers take account of big ideas and pertinent threshold concepts to plan a coherent, 'spiral' curriculum for Science which secures mastery and progression in conceptual understanding and builds knowledge from 'novice' to 'expert'.
Teachers take account of big ideas and related threshold concepts in their Science planning for Science lessons to secure mastery of subject knowledge, year on year and over time.

Key Skills: Know how to:

Working Scientifically:

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, and bar and line graphs
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

Enquiry Logos will be used to signpost:

Y5 Key Knowledge - know about:

Theme 1A

Properties and changes of materials How do you separate a mixture?

- 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. –

Y6 Key Knowledge – know about:

Theme 1B

Electricity What makes a circuit change?

- 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

(+ Design Technology 3A)

- ♣ Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- ♣ Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- ♣ Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- ♣ Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- ♣ Demonstrate that dissolving, mixing and changes of state are reversible changes
- ♣ Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Theme 4A

Earth and Space What is the role of the Earth in the solar system?

- ♣ 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

Theme 7A

Animals and humans How do our lifestyle choices affect our circulatory system?

Light How does light travel?

- ♣ 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

Theme 4B

Forces How do forces affect us?

- ♣ Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- ♣ Identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- ♣ Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

Theme 7B

Living things and their habitats, Evolution and Inheritance

How do living things change over time?

- ♣ 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.

♣ 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 **Living Things** **How can we categorise different plants?** ♣ 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	♣ Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago ♣ Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents ♣ Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.