Progression of knowledge and skills **Subject: Science**

Science Curriculum

Subject Knowledge (Substantive Knowledge)		Working Scientifically (Disciplinary Knowledge)		Scientific Thinkers
Biology Plants Animals Including Humans Living Things and their Habitats Evolution and Inheritance		comparative / fair testing research observation over time pattern seeking identifying, grouping and classifying		Scientific thinkers who can work scientifically with increasing expertise.
Chemistry Rocks States of Matter Properties and Changes of Materials				
Physics Light Forces Sound Electricity Earth and Space				

Overview of Units

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y1	Materials	Seasons	Animals	Animals/ Plants	Plants	*
Y2	Materials	Living Things	Living Things/ Animals	Animals	Plants	*
Y3	Light	Forces	Rocks	Animals	Plants	*
Y4	States of Matter	Sound	Electricity	Animals	Living Things	*
Y5	Materials	Forces	Earth and Space	Animals	Living Things	*
Y6	Light	Electricity	Evolution and Inheritance	Animals	Living Things	*

*Opportunity to finish topics, revision of learning and to prepare for future learning.

Progression of knowledge and skills — Subject: Science

Materials	Year 1	Year 2	Year 5
Knowledge	**MATERIAL FOCUS- STEEL** • Distinguish between an object and the material from which it is made. • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. • Describe the simple physical properties of a variety of everyday materials. • Compare and group together a variety of everyday materials on the basis of their simple physical properties.	**MATERIAL FOCUS- STEEL** • Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. • Find out how the shapes of solid objects made from some materials can be changed by squashing.	**MATERIAL FOCUS- STEEL** • 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.
Skills	Identifying and classifying *I can use relevant science words to name objects and materials.* Observing closely using simple equipment *I can select information from observations to describe properties of materials* Asking simple questions and recognising that they can be answered in different ways *I can group materials things by size, colour, shape, properties etc..* Perform simple tests. *I can suggest everyday materials to use in an investigation.*	Identifying and classifying. Using their observations and ideas suggest answers to questions. *I construct block charts & pictograms to show that materials can be used for more than one thing.* Identifying and classifying. Using their observations and ideas suggest answers to questions. *I can say how properties of materials are the same or different* Performing simple tests. *I can suggest whether materials can be changed in an investigation.* Gathering and recording data to help in answering questions *I can describe changes in materials that have been developed.*	Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. *I begin to use complex science words correctly to explain why materials are suited to their roles.* Planning scientific enquiries to answer questions, including recognising and controlling variables where necessary. *I can plan a fair test and ensure controlled variables are kept the same to investigate dissolving.* Planning scientific enquiries to answer questions, including recognising and controlling variables where necessary. *I can select suitable equipment to separate mixtures.* Reporting and presenting findings from enquiries, including conclusions, casual relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. *I can use my conclusions to explain if a mixture can be separated.*

Links across the science curriculum

EYFS	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside.
Year 3	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. (Y3 - Rocks) • Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • 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. (Y3 - Forces and magnets)
Year 4	• 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. • Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)
KS3	• Chemical reactions as the rearrangement of atoms. • Representing chemical reactions using formulae and using equations. • Combustion, thermal decomposition, oxidation and displacement reactions. • Defining acids and alkalis in terms of neutralisation reactions. • The pH scale for measuring acidity/alkalinity; and indicators.

Progression of knowledge and skills — Subject: Science

Animals	Year 1	Year 2	Year 3
Knowledge	**ANIMAL FOCUS- HUMAN AND FROG** • 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 with each sense.	**ANIMAL FOCUS- HUMAN AND FROG** • 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.	**ANIMAL FOCUS- HUMAN AND FROG** • Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat. • Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
Skills	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. *I can use and add labels to diagrams to identify animals.* Identifying differences, similarities or changes related to simple scientific ideas. *I can group animals by what they eat.* Recording findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. *I can use relevant words when I talk or write to identify parts of the body.* Using straightforward scientific evidence to answer questions or to support their findings. *I can use my senses to identify properties of materials.*	Using their observations and ideas to suggest answers to questions *I can add labels to diagrams to identify and describe changes as we grow.* Using their observations and ideas to suggest answers to questions *I can compare the changes that happen in animals and humans as they grow.* Identifying and classifying. *I can use science facts to identify survival needs.* Identifying and classifying. *I can select relevant information to explain survival needs.* Perform simple tests. *I can follow spoken and picture instructions to follow good hygiene routines*	Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables *I can use science facts to explain why we have a skeleton.* Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables *I can begin to use science models to describe how we move.* Using straightforward scientific evidence to answer questions or to support their findings *I can link relevant information to explain what animals, including humans, need to stay healthy.* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions *I can add labels and relevant information to diagrams to identify a balanced diet.*
	Year 4	**Year 5**	**Year 6**
Skills	**ANIMAL FOCUS- HUMAN AND FROG** • 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.	**ANIMAL FOCUS- HUMAN AND FROG** • Describe the changes as humans develop to old age.	**ANIMAL FOCUS- HUMAN AND FROG** • 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.
Knowledge	Identifying differences, similarities or changes related to simple scientific ideas and processes. *I can annotate diagrams to identify different types of teeth.* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. *I can use my scientific knowledge to explain how to care for teeth.* Setting up simple practical enquiries, comparative and fair tests. *I can plan a fair test by selecting variables to change and measure to explore digestion.* Recording findings using simple scientific language, drawings, labelled diagrams. keys, bar charts and tables. *I can use science models to identify and describe parts of the digestive system.* Recording findings using simple scientific language, drawings, labelled diagrams. keys, bar charts and tables. *I can construct a simple table correctly to organise living things in a food chain.*	Reporting and presenting findings from enquiries, in oral and written forms such as displays and other presentations *I can construct a table to show how the gestation period of humans and other living things differ.* Reporting and presenting findings from enquiries, including conclusions, causal relationship and explanation with a degree of trust in results, in oral and written forms such as displays and other presentations. *I can describe simple patterns and relationships in data relating to growth of a baby through childhood.* Recording data and results of increasing complexity using scientific diagrams and labels. *I begin to use complex science words correctly to explain changes within teenage years.* Recording data and results of increasing complexity using scientific diagrams and labels. *I can use my scientific understanding to identify and explain the impact of changes within adulthood.*	Reporting and presenting findings from enquiries, including conclusions, causal relationships in oral and written forms such as displays and other presentations. *I use complex science words correctly to explain the circulatory system in the body.* Reporting and presenting findings from enquiries, including conclusions, causal relationships in oral and written forms such as displays and other presentations. *I use science models to describe the function of blood.* Reporting and presenting findings from enquiries, including conclusions, causal relationships in oral and written forms such as displays and other presentations. *I use science models to explain how blood gets around our body.* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. *I plan to collect repeat readings and calculate mean pulse rate for accuracy.* Identifying scientific evidence that has been used to support or refute ideas or arguments. *I present a clear and logical answer to a question to explain the impact that diet, exercise and drugs have on the body.*

Links across the science curriculum

EYFS	• Use all their senses in hands-on exploration of natural materials. • Begin to make sense of their own life-story and family's history. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Talk about members of their immediate family and community. • Name and describe people who are familiar to them. • Recognise some environments that are different to the one in which they live.
Year 2	• 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. (Y2 - Living things and their habitats)
Year 5	• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. (Y5 - Living things and their habitats) • Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	• 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. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
KS3	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. • The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases. • The effects of recreational drugs (including substance misuse) on behaviour, health and life processes. • The structure and functions of the gas exchange system in humans, including adaptations to function. • The mechanism of breathing to move air in and out of the lungs. • The impact of exercise, asthma and smoking on the human gas exchange system.

Progression of knowledge and skills — Subject: Science

Plants	Year 1	Year 2	Year 3
Knowledge	**PLANT FOCUS- TULIP** • Identify and name a variety of common plants, inc garden plants, wild plants and trees - deciduous and evergreen. • Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.	**PLANT FOCUS- TULIP** • Understand that seeds and bulbs need water to grow but most do not need light; seeds and bulbs have a store of food inside them. • Observe and describe how seeds and bulbs grow into mature plants. • Understand the process of reproduction and growth in plants.	**PLANT FOCUS- TULIP** • Look at the function of parts of flowering plants, requirements of growth, water transportation in plants, life cycles and seed dispersal. • Investigate the way in which water is transported within plants.
Skills	Identifying and classifying. *I select information to name plants with help* Observe closely, using simple equipment. *I can look at pants and trees and can describe their features* Using their observations and ideas to suggest answers to questions *I describe the changes that might happen in trees.* Gathering and recording data to help in answering questions *I use relevant science words when I talk or write to name parts of plants.*	Observe closely, using simple equipment. *I group seeds and bulbs using observable features* Using their observations and ideas to suggest answers to questions. *I can use science facts to describe how plants grow.* Performing simple tests *I suggest an idea to test to explore what plants need to be healthy e.g. water, light.* Using their observations and ideas to suggest answers to questions. *I can use science facts to describe reproduction in plants and the changes a seed goes through.* .	Making systematic and careful observations and, where appropriate taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. *I can add labels and relevant information to identify and describe parts of a flowering plant.* Using straight forward scientific evidence to answer questions or to support their findings. *I can describe my results by linking cause and effect to identify how water travels around a plant.* Setting up simple practical enquiries, comparative and fair tests. *I can predict the effect different conditions might have on plant growth e.g. space, nutrients.* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. *I can use science facts to explain the function of a flower.*

Links across the science curriculum

EYFS	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Plant seeds and care for growing plants. • Understand the key features of the life cycle of a plant and an animal. • Begin to understand the need to respect and care for the natural environment and all living things. • Draw information from a simple map. (Reception – Living things and their habitats) • Explore the natural world around them. (Reception – Living things and their habitats) • Describe what they see, hear and feel whilst outside. (Reception – Living things and their habitats) • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats) • Understand the effect of changing seasons on the natural world around them. (Reception – Seasonal changes)
Year 2	• Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)
Year 4	• Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Year 5	Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	• 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. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)

KS3	Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

Seasons	**Year 1**
Knowledge	• Understand that there are different seasons • Observe changes across the four seasons • Observe and describe weather associated with the seasons and how day length varies • Discuss appropriate clothing and practices associated with the weather • Know that it is not safe to look directly at the Sun, even when wearing dark glasses
Skills	Identify and classify *I use relevant words when I talk or write to name the seasons.* Observe closely, using simple equipment *I can describe what the weather using words or pictures.* Using their observations and ideas to suggest answer to questions *I can follow instructions to select appropriate clothes for each season* Gathering and recording data to help in answering questions *I can use pictures or actions to describe & explain hours of daylight in each season.*

Links across the science curriculum

EYFS	• Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Understand the effect of changing seasons on the natural world around them.
Year 3	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. (Y3 - Light)
Year 5	Use the idea of the Earth's rotation to explain day and night and the apparent movement of the Sun across the sky. (Y5 - Earth and space)
KS3	The seasons and the Earth's tilt, day length at different times of year, in different hemispheres.

Progression of knowledge and skills **Subject: Science**

Living Things	Year 2	Year 4	Year 5	Year 6
Knowledge	**LIVING THING FOUCS- HUMAN AND FROG** • Explore and compare the differences between things that are living, that are dead and that have never been alive. • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants and how they depend on each other. • Identify and name a variety of plants and animals in their habitats, including micro-habitats. • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	**LIVING THINGS FOUCS- HUMAN AND FROG** • Recognise that living things can be grouped in a variety of ways. • Explore and use classification keys. • Recognise that environments can change and this can sometimes pose dangers to specific habitats.	**LIVING THING FOUCS- HUMAN AND FROG** • 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.	**LIVING THING FOUCS- HUMAN AND FROG** • Describe how living things are classified into broad groups according to common observable characteristics. • Give reasons for classifying plants and animals based on specific characteristics.
Skills	Identifying and classifying *I can remember simple facts to identify what makes something 'living'* Identifying and classifying *I can group living, dead and non-living things using observations.* Observe closely using simple equipment. *I can select relevant information to explain what a habitat is.* Gathering and recording data to help in answering questions. *I can use science facts to describe how living things are adapted to their habitat* Using observations and ideas to suggest answers to questions. *I can use a simple diagram to record a food chain.*	Asking relevant questions and using different types of scientific enquiries to answer them. *I can use simple science words correctly to group living things by fine differences.* Recording findings using simple scientific language, drawings labelled diagrams, keys, bar charts and tables. *I can create appropriate groups for sorting using a classification key.* Reporting on findings from, enquiries, including oral and written explanations, displays or presentations of results and conclusions. *I can use science words accurately to explain how living things are adapted to their habitats.* Asking relevant questions and using different types of scientific enquiries to answer them. *I can link related information to explain how habitats change and the impact of the change.*	Identifying scientific evidence that has been used to support or refute ideas or arguments. *I can show a clear understanding of how scientists find out about living things* Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations. *I can draw and annotate my own diagrams to compare life cycles.* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. *I can begin to use complex science words correctly in order to explain how plants reproduce.* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate *I can use data in my conclusions and use science to explain what effects plant reproduction.*	Reporting and presenting findings from enquiries, including and explanations. *I can sort living things into groups and sub-groups using observations* Identifying scientific evidence that has been used to support or refute ideas or arguments *I can present a clear and logical answer to a question to sort living things using the Carl Linnaeus system.* Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables. *I can construct a classification key to identify living things.*

Links across the science curriculum

• **EYFS**	• Use all their senses in hands-on exploration of natural materials. • Explore collections of materials with similar and/or different properties. • Begin to understand the need to respect and care for the natural environment and all living things. • Draw information from a simple map. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside. • Recognise some environments that are different to the one in which they live.
• **Year 1**	• Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees. (Y1 - Plants) • Identify and describe the basic structure of a variety of common flowering plants, including trees. (Y1 - Plants) • Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 –Animals, including humans) • Observe changes across the four seasons. (Y1 - Seasonal change)
• **Year 2**	• Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals including humans)
• **Year 3**	• Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
• **Year 4**	• Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans)
• **Year 6**	• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. (Y6 - Evolution and inheritance) • Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. (Y6 - Evolution and inheritance)
• **KS 3**	• Reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta. • Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms. • Differences between species.

Progression of knowledge and skills **Subject: Science**

Light	• Year 3	• Year 6
Knowledge	• Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the size of shadows change.	• Understand that light appears to travel in straight lines. • Understand that objects are seen because they give out or reflect light into the eyes. • Understand that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes. • Understand that shadows have the same shape as the objects that cast them.
Skills	Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. *I can use science facts to explain why light can be dangerous.* Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. *I can add labels and relevant information to diagrams to explain how we see things.* Setting up simple practical enquiries, comparative and fair tests. *I can select suitable equipment for a task to explore which materials let light through.* Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. *I can link properties of materials to identify which materials let light through.* Using straightforward scientific evidence to answer questions or to support their findings. *I can link relevant information together to explain what a shadow is.*	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables when necessary *I can use science models to describe how light travels and explain my evidence.* Reporting and presenting findings from enquiries, including conclusions with a degree of trust in results. taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. *I can plan a reliable fair test with variables to explore what happens when light hits an object.* Recording data and results of increasing complexity using scientific diagrams and labels. *I can draw and annotate my own diagrams to help describe how a periscope works.* Using test results to make predictions to set up further comparative and fair tests. *I can use scientific knowledge and understanding to make a hypothesis about future investigations about shadows*

Links across the science curriculum

• **EYFS**	• Explore how things work. • Talk about the differences in materials and changes they notice. • Describe what they see, hear and feel whilst outside.
• **Year 1**	• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Materials)
• **Year 5**	• 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. (Y5 - Properties and changes of materials)
• **KS 3**	• The similarities and differences between light waves and waves in matter. • Light waves travelling through a vacuum; speed of light. • The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface. • Use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye. • Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras. • Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflectio

Progression of knowledge and skills — Subject: Science

Forces	• Year 3	• Year 5
Knowledge	• Compare how things move on different surfaces. • Notice that some forces need contact between two objects, but magnetic forces can act at a distance. • Observe how magnets attract or repel each other and attract some materials and not others. • Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials. • Describe magnets as having two poles. • Predict whether two magnets will attract or repel each other, depending on which poles are facing.	• Understand the force of gravity. • Understand the effects of friction, including air resistance and water resistance. • Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.
Skills	Identifying differences, similarities or changes to simple scientific ideas and processes. *I can use science ideas and facts to describe how things move.* Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions. *I can identify cause and effect in my investigation to explore different magnets.* Asking relevant questions and using different types of scientific enquiries to answer them. *I can group magnetic and non-magnetic materials.* Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables. *I can link properties of magnetic materials to a function.*	Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations *I can use complex science words correctly to identify contact forces.* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary *I can use knowledge and understanding of forces to predict the effects of friction.* Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs *I can use data in my conclusions and use science to explain* Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations *I can select suitable equipment to explore non-contact forces.*

Links across the science curriculum

• **EYFS**	• Explore how things work. • Explore and talk about different forces they can feel. • Talk about the differences between materials and changes they notice. • Explore the natural world around them. • Describe what they see, hear and feel whilst outside.
• **Year 2**	• Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)
• **Year 5**	• 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.
• **KS 3**	• Magnetic fields by plotting with compass, representation by field lines. • Earth's magnetism, compass and navigation. • Forces as pushes or pulls, arising from the interaction between two objects. • Using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces. • Moment as the turning effect of a force. • Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water. • Forces measured in Newtons, measurements of stretch or compression as force is changed.

Progression of knowledge and skills **Subject: Science**

Rocks	• Year 3
Knowledge	• Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. • Relate the simple physical properties of some rocks to their formation (igneous or sedimentary). • Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock. • Recognize that soils are made from rocks and organic matter.
Skills	Identifying differences, similarities or changes related to simple scientific ideas and processes *I can group rocks by difference, similarity or change* Setting up simple practical enquiries, comparative and fair tests. *I can notice obvious risks in my investigation into how rocks change.* Asking relevant questions and using different types of scientific enquiries to answer them. *I can use science facts to describe and explain how fossils are made.* Using straightforward scientific evidence to answer questions or to support their findings *I can use properties of soil to predict cause and effect in my investigation.*

Links across the curriculum

• **EYFS**	• Use all their senses in hands-on exploration of natural materials. (Nursery – Living things and their habitats) • Explore collections of materials with similar and/or different properties. (Nursery – Living things and their habitats) • Explore the natural world around them. (Reception – Living things and their habitats) • Describe what they see, hear and feel whilst outside. (Reception – Living things and their habitats)
• **Year 1**	• Distinguish between an object and the material from which it is made. (Y1 - Everyday materials) • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials) • Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials) • Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)
• **Year 2**	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
• **Year 5**	• Compare and group together everyday materials on the basis of their properties. • Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
• **Year 6**	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. (Y6 - Evolution and inheritance)
• **KS 3**	• The composition of the Earth. • The structure of the Earth. • The rock cycle and the formation of igneous, sedimentary and metamorphic rocks.

Progression of knowledge and skills **Subject: Science**

Electricity	• Year 4	Year 6
• Knowledge	• Identify common appliances that run on electricity. • Construct a simple series circuit, identifying and naming cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit based on looking at the [in]complete loop. • Recognise a switch opens and closes a circuit and associate this with a lamp light in a simple series circuit. • Recognise some common conductors and insulators, associating metals with (generally) being good conductors.	• Understand that there is an association between the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. • Understand how components function, including bulbs, buzzers and switches. • Recognise the correct symbols when representing a simple circuit in a diagram.
• Skills	Ask relevant questions and using different types of scientific enquiries to answer them. *I can create appropriate groups for sorting electrical appliances* Setting up simple practical enquiries, comparative and fair tests. *I can select suitable electrical components for a task.* Using straightforward scientific evidence to answer questions to support their findings. *I can show a use my understanding of circuit to explain how a switch works.* Recording findings using simple scientific language, drawings, labelled diagrams keys, bar charts and tables. *I can describe properties of materials to identify electrical conductors and insulators.*	Recording data and results of increasing complexity using scientific diagrams and labels *I can draw and annotate a diagram, using symbols, to record my working circuit.* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary *I can plan a reliable fair test with dependent and independent variables to explore energy.* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision. *I can construct a graph correctly to display my measurement.* Using test results to make predictions to set up further comparative and fair tests *I can use my scientific knowledge and understanding to make a hypothesis about a circuit.*

Links across the curriculum

• **EYFS**	• Explore how things work.
• **KS 3**	• Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge. • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current. • Differences in resistance between conducting and insulating components (quantitative). • Static electricity.

Progression of knowledge and skills **Subject: Science**

States of Matter	• Year 4
Knowledge	• Explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container) • Observe water as a solid, liquid and a gas, noting changes to water when heated or cooled • Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
Skills	Identifying differences, similarities or changes related to simple scientific ideas and processes. *I can describe properties of materials and sort into solid, liquids and gases.* Recording on findings from enquiries, including oral and written explanations, displays or presentations of results or conclusions. *I can use science models to describe what makes a solid, liquid or a gas.* Setting up simple practical enquiries, comparative and fair tests. *I can select suitable equipment for a task to test melting points.* Using straight forward scientific evidence to answer questions or to support their findings. *I can use simple science words correctly to explain evaporation and condensation.* Using straight forward scientific evidence to answer questions or to support their findings. *I can use my knowledge and understanding of science to explain the water cycle.*

Links across the curriculum

• **EYFS**	• Explore collections of materials with similar and/or different properties. • Talk about the differences between materials and changes they notice.
• **Year 1**	• describe the simple physical properties of a variety of everyday materials • compare and group together a variety of everyday materials on the basis of their simple physical properties (Y1 Materials)
• **Year 2**	• find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching (Y2- Materials)
• **Year 3**	• investigate the way in which water is transported within plants (Y3- Plants)
• **Year 4**	• Identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear (Y4- sound)
• **Year 5**	• 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 (Y5 -Materials)
• **KS3**	• the properties of the different states of matter (solid, liquid and gas) in terms of the particle model, including gas pressure • changes of state in terms of the particle model • energy changes on changes of state (qualitative)
	• conservation of material and of mass, and reversibility, in melting, freezing, evaporation, sublimation, condensation, dissolving • similarities and differences, including density differences, between solids, liquids and gases • diffusion in liquids and gases driven by differences in concentration • the difference between chemical and physical changes • the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density; the anomaly of ice-water transition • atoms and molecules as particles

	• changes with temperature in motion and spacing of particles

Sound	• **Year 4**
• **Knowledge**	• Explore and identify the way sound is made through vibration in a range of different musical instruments from around the world • Recognise that vibrations from sound travel through a medium to the ear. • Understand pitch and find out how the pitch of sounds can be changed in a variety of different ways • Understand volume and find out how the volume of sounds can be changed in a variety of ways • Recognise that sounds get fainter as the distance from the sound source increases
• **Skills**	Asking relevant questions and using different types of scientific enquiries to answer them. *I can use science models to describe what sound it.* Gathering recording, classifying and presenting data in a variety of ways to help in answering questions. *I can annotate diagrams to help explain how sound travels to our ears.* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions *I can identify trends and can use science to explain the relationships between volume and vibration.* Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions *I can design and write a simple ordered method to explore pitch.*

Links across the curriculum

• **EYFS**	• Explore how things work. • Describe what they see, hear and feel whilst outside.
• **Year 1**	• Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. (Y1 - Animals, including humans)
• **Year 4**	• Explore a variety of everyday materials and develop simple descriptions of the states of matter. Links to particle behaviour.
• **KS 3**	• Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition. • Frequencies of sound waves, measured in Hertz (Hz); echoes, reflection and absorption of sound. • Sound needs a medium to travel, the speed of sound in air, in water, in solids. • Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. • Auditory range of humans and animals. • Pressure waves transferring energy; use for cleaning and physiotherapy by ultra-sound. • Waves transferring information for conversion to electrical signals by microphone.

Earth and Space	• **Year 5**
Knowledge	• 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.
Skills	Recording data and results of increasing complexity using scientific diagrams and labels. *I can use some complex science words correctly to describe our solar system* Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking readings when appropriate *I can measure the length of shadows to describe patterns in my data.* Recording data and results of increasing complexity using scientific diagrams and labels. *I can use science models to describe and begin to explain why we have day and night.* Reporting and presenting findings from enquiries. *I can use my understanding of science concepts to identify phases of the moon.* Identifying scientific evidence that has been used to support or refute ideas or arguments *I can select and prioritise information to create an argument against the geocentric model of the solar system.*

Links across the curriculum

• **EYFS**	• Explore the natural world around them.
• **Year 1**	• Observe changes across the four seasons. (Y1 – Seasonal changes) • Observe and describe weather associated with the seasons and how day length varies. (Y1 – Seasonal changes)
• **KS 3**	• Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only). • Our Sun as a star, other stars in our galaxy, other galaxies. • The seasons and the Earth's tilt, day length at different times of year, in different hemispheres. • The light year as a unit of astronomical distance.

Evolution and Inheritance	• **Year 6**
Knowledge	• 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.
Skills	Identifying scientific evidence that has been used to support or refute ideas or arguments *I can present a clear and logical answer to a question to explain why fossils are important.* Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of *I can group observable similarities and differences between individuals.* Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. *I can select suitable equipment to investigate adaptation.* Identifying scientific evidence that has been used to support or refute ideas or arguments *I can present a clear and logical argument to explain Darwin's theory of evolution.*

Links across the curriculum

• **EYFS**	• Begin to understand the need to respect and care for the natural environment and all living things. (Nursery – Living things and their habitats) • Recognise some environments that are different to the one in which they live. (Reception – Living things and their habitats)
• **Year 2**	• 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. (Y2 - Living things and their habitats) • Notice that animals, including humans, have offspring which grow into adults. (Y2 - Animals, including humans)
• **Year 3**	• Describe in simple terms how fossils are formed when things that have lived are trapped within rock. (Y3 - Rocks) • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. (Y3 - Plants)
• **Year 4**	• Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
• **Year 5**	• Describe the life process of reproduction in some plants and animals. (Living things and their habitats - Y5)
• **KS 3**	• Heredity as the process by which genetic information is transmitted from one generation to the next. • A simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model. • The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. • Changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction.