



St Joseph's RC Voluntary Academy, Todmorden



Progression of skills - Science

EYFS – Development Matters

3 and 4 years olds will be learning to:

- Explore how things work.
- Use all their senses in hands-on exploration of natural materials.
- Explore collections of materials with similar and/or different properties.
- Talk about what they see, using a wide vocabulary.
- 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.
- Explore and talk about different forces they can feel.
- Talk about the differences between materials and changes they notice.

Children in Reception will be learning to:

- Explore the natural world around them.
- Describe what they see, hear and feel whilst outside.
- Recognise some environments that are different from the one in which they live.
- Understand the effect of changing seasons on the natural world around them.

Early Learning Goals

Personal Social and Emotional Development

Managing Self ELG

Manage their own basic hygiene and personal needs, including dressing, going to the toilet, and understanding the importance of healthy food choices.

Understanding of the World

The Natural World ELG

- 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.

	Keys stage 1	Lower key stage 2	Upper key stage 2
Working Scientifically Disciplinary knowledge	<ul style="list-style-type: none"> • asking simple questions and recognising that they can be answered in different ways • observing closely, using simple equipment • performing simple tests • identifying and classifying • using their observations and ideas to suggest answers to questions • gathering and recording data to help in answering questions 	<ul style="list-style-type: none"> • asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings 	<ul style="list-style-type: none"> • planning different types of scientific enquiry • to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments
Biology Substantive knowledge and disciplinary knowledge	<p><i>Year A and B</i></p> <ul style="list-style-type: none"> • knowing and explaining what an animal is and what a plant is <p><i>Year A: Animals including Humans, Plants</i></p> <ul style="list-style-type: none"> • knowing and explaining how seasons influence plants and animals • knowing and identifying the common features of fish, amphibians, reptiles, birds and mammals • knowing, explaining and grouping animals by the types of food they eat 	<p><i>Year A: Animals including humans, Plants</i></p> <ul style="list-style-type: none"> • knowing and explaining that animals, including humans, need the right types and amounts of nutrition • knowing and explaining that animals only get nutrition from the food they eat – they cannot make their own food like plants • knowing, identifying and explaining the purpose and function of the human skeleton, such as supporting the body, protecting the lungs and helping joints move 	<p><i>Year A: Animals including humans, Living things and their habitats</i></p> <ul style="list-style-type: none"> • knowing, describing and explaining the changes humans go through to old age • knowing and using a timeline to show stages of growth and development of humans, including puberty • knowing, comparing and explaining the difference in gestation periods of humans to other animals, such as an elephant or butterfly

	Keys stage 1	Lower key stage 2	Upper key stage 2
	<ul style="list-style-type: none"> • knowing and explaining the places (habitats) that fish, amphibians, reptiles, birds and mammals live • knowing and locating the main body parts of a human • knowing the five senses and explaining how they help compare different textures, sounds and smells • knowing and identifying the basic structure of plants and trees, such as roots, bulbs, stem, leaf, flower, fruits, trunk, branch and crown • knowing and identifying the common names of wild and garden plants • knowing and identifying explaining different trees in the locality, such as oak or Horse Chestnut • knowing and explaining the difference between evergreen and deciduous trees, including the influence of seasons <p><i>Year B: Living Things and Their Habitats, Animals including Humans, Plants</i></p> <ul style="list-style-type: none"> • knowing and explaining the common characteristic of living things, such as MRS GREN • knowing and explaining the difference between things that are living, dead and things that have never been alive • knowing and explaining what a habitat is and why plants and animals that live there are best suited to it • knowing and identifying a variety of plants and animals in micro-habitats and habitats • knowing and explaining what an animal is and how they get their food from other plants and animals • knowing and explaining what a simple food chain is, including the direction of energy 	<ul style="list-style-type: none"> • knowing, identifying and explaining the purpose and function of the muscles, such as skeletal, cardiac or smooth muscles • knowing and explaining the difference between vertebrates and invertebrates • knowing and identifying the structure of the different parts of flowering plants • knowing and explaining the function of the parts of flowering plants • knowing and explaining what plants need to live and grow, such as air, light, water, nutrients from soil and space to grow • knowing how water is transported within plants and explaining the process of transpiration • knowing and explaining the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal <p><i>Year B: Living things and their habitats, Animals including humans</i></p> <ul style="list-style-type: none"> • knowing and explaining that living things can be grouped in a variety of ways, such as vertebrate or invertebrate and flowering and non-flowering plants • knowing, using and explaining the classification of vertebrates, such as fish, amphibians, reptiles, birds and mammals • knowing, using and explaining the classification of invertebrates, such as snails and slugs, worms, spiders and insects • knowing and use classification keys to group, identify and name a variety of living things in their local environment • knowing and explaining the impact on living things if their habitat changes 	<ul style="list-style-type: none"> • knowing, identifying and explaining the differences in the life cycles of a mammal (dog), an amphibian (frog), an insect (ladybird) and a bird (chicken) • knowing and explaining the life process of reproduction in some plants and animals • knowing and explaining about a significant scientist, such as Maria Merion who David Attenborough described as one of the most important contributors to entomology <p><i>Year B: Animals including humans, Animals including humans (water Transport)</i></p> <ul style="list-style-type: none"> • knowing, identifying and explaining the main parts of the human circulatory system and describe the functions of the heart, aorta, pulmonary vein, left atrium, right atrium, left ventricle, right ventricle, arteries, veins and capillaries, oxygenated and deoxygenated • knowing, identifying and explaining the components and function of blood, such as plasma, red blood cells, white blood cells, platelets, nutrients and oxygen • knowing and explaining the impact of diet, exercise, drugs and lifestyle on the way their bodies function • knowing, describing and explaining the ways in which nutrients and water are transported within animals, including humans • knowing and explaining how significant scientists helped us understand more about the circulatory system, such as Galen or William Harvey • knowing and explaining 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

	Keys stage 1	Lower key stage 2	Upper key stage 2
	<ul style="list-style-type: none"> • knowing and explaining that animals, including humans, have offspring which grow into adults • knowing and explaining simple life cycles of animals, including humans • knowing and explaining that animals need water, food and air to survive • knowing and explaining that to be healthy, humans need to exercise, eat the right amounts of different types of food and keep clean • knowing and explaining what conditions are needed for seeds to germinate and mature into plants • knowing and explaining how bulbs grow • knowing and explaining the conditions that plants need to thrive, grow, mature, and reproduce 	<ul style="list-style-type: none"> • knowing and identifying the parts of the human digestive system, such as the mouth, tongue, teeth, oesophagus, stomach, small and large intestine • knowing and explaining the functions of the parts of the human digestive system, such as the mouth, tongue, teeth, oesophagus, stomach, small and large intestine • knowing and explaining the different teeth that carnivores and herbivores have and why this is important for their diet • knowing, constructing and explaining food chains • knowing and identifying producers, predators and prey in a food chain 	<ul style="list-style-type: none"> • knowing and identifying the five major kingdoms of living things, including plant, animal, fungi, algae, slime and mould, and bacteria • knowing and explaining how significant scientists, such as Aristotle or Carl Linnaeus, helped us understand more about classification • knowing, using and explaining taxonomy • knowing and explaining reasons for classifying plants and animals based on specific characteristics, such as vertebrates or invertebrates • knowing and using classification systems and keys to identify some animals and plants in the immediate environment • knowing how to classify animals and plants they are unfamiliar with using a classification system • knowing and explaining that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago, such as body fossils, mould fossils, cast fossils and trace fossils • knowing and explaining that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • knowing, identifying and explaining how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution • knowing and explaining about significant scientists who have helped us understand the theory of evolution, such as Alfred Wallace and Charles Darwin
Physics	<i>Year A: Seasonal Changes and Daily Weather</i> <ul style="list-style-type: none"> • knowing and explaining the order of seasons 	<i>Year A: Forces and Magnets, Light</i>	<i>Year A: Forces, Earth in Space</i>

	Keys stage 1	Lower key stage 2	Upper key stage 2
	<ul style="list-style-type: none"> • knowing and explaining the changes within each season including months of the year • knowing different patterns of weather and explaining, for example, how rain can occur in all seasons • knowing that the earth rotates and explaining how day and night occurs 	<ul style="list-style-type: none"> • knowing how objects move on different surfaces using friction and resistance to explain why • knowing and explaining the difference between contact and non-contact forces • knowing and explaining how magnets attract and repel each other • knowing and explaining how magnets attract some materials and not others • using what they know about the properties of materials from KS1 to group everyday materials that are attracted to a magnet • knowing and identifying magnetic materials • knowing and explaining that a magnet has two poles, and predicting whether they will attract or repel each other • knowing and explaining that light is needed to see things • knowing and explaining that dark is the absence of light • knowing and explaining that light is reflected from surfaces and enters our eyes • knowing that the light of the sun can be dangerous and how to protect their eyes • knowing and explaining that shadows are formed when light from a source is blocked by an opaque object • knowing and explaining how shadows change size <p><i>Year B: Electricity and Sound</i></p> <ul style="list-style-type: none"> • knowing and explaining that household appliances run on electricity from mains or batteries • knowing, identifying and explaining what a simple single loop circuit is (also know as a simple series electrical circuit) 	<ul style="list-style-type: none"> • knowing and explaining that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • knowing, identifying and explaining the effects of air resistance, water resistance and friction, that act between moving surfaces, such as a parachute or a brake on a bike • knowing and explaining how significant scientists, such as Isaac Newton or Galileo Galilei helped develop the theory of gravitation • knowing, experiencing and explaining how the effect of friction on movement slows or stops moving objects • knowing and explaining that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect known as a force multiplier • knowing and experiencing how levers, pulleys and gears multiply a smaller force to achieve a greater effect, such as removing a nail using a claw hammer, making simple pulleys and gears on a bike • knowing and identifying the eight planets in our solar system - Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune • knowing and identifying Pluto as a dwarf planet • knowing, identifying and explaining the movement of the Earth and other planets, relative to the Sun in the solar system • knowing and explaining the movement of the Moon relative to the Earth • knowing and explaining that a moon is a celestial body that orbits a planet, such as the Moon around Earth or the four large moons of

	Keys stage 1	Lower key stage 2	Upper key stage 2
		<ul style="list-style-type: none"> • knowing, identifying and explaining the component of a single loop circuit, such as cells, wires, bulbs, switches and buzzers • knowing and explaining 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 • knowing and explaining that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a single loop circuit • knowing and identifying that some common conductors and insulators as well as associating metals with being good conductors. • knowing and explaining that current is the flow of electricity through a circuit • knowing and explaining how sounds are made through vibrations and travel as waves • knowing and explaining how sounds travel through a medium, such as a solid (wood), a liquid (water) or gas (air) • knowing and explaining how sounds travel through a medium to the ear as vibrations • knowing and explaining that sound is the transfer of energy • knowing and explaining what pitch means – frequency of the sound wave • knowing and explaining what loudness means – the size of the sound wave • knowing, identifying and explaining patterns between the pitch of a sound and the features of the object that produced it, such as the length of an elastic band • knowing, identifying and explaining patterns between the volume of a sound and the strength of the vibrations that produced it, such as the bang of a drum 	<p>Jupiter - Io, Europa, Ganymede and Callisto first seen by Galileo Galilei</p> <ul style="list-style-type: none"> • knowing and explaining that the Sun, Earth and Moon are approximately spherical bodies • knowing about Earth's rotation to explain day and night and the apparent movement of the sun across the sky <p><i>Year B: Electricity, Light</i></p> <ul style="list-style-type: none"> • knowing and explaining how a single loop circuit (series circuit) works • knowing and explaining how the brightness of a lamp or the volume of a buzzer is affected by the number and voltage of cells used in a circuit • knowing, using and explaining the reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • knowing and using recognised symbols when representing a simple circuit in a diagram • knowing and explaining how to be safe when working with electricity • knowing and explaining that light appears to travel in straight lines • knowing that light travels in straight lines to explain how objects are seen because they give out or reflect light into the eye • knowing and explaining that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • knowing that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

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		<ul style="list-style-type: none"> • knowing and explaining that sounds get fainter as the distance from the sound source increases 	
Chemistry	<p><i>Year A and B: Everyday materials and Uses of Everyday materials. (teachers will move pupils on to the suitability of everyday materials and how knowledge of the properties of materials have influenced the work of scientists in their second year of KS1).</i></p> <ul style="list-style-type: none"> • knowing and explaining the difference between an object and the material from which it is made, such as metal and a spoon • knowing and explaining the properties of materials, such as hard / soft, stretchy, / stiff, rough / smooth, bendy / rigid, waterproof /not waterproof, absorbent / not absorbent, opaque / translucent / transparent • knowing, comparing and explaining the properties and suitability of everyday materials for particular uses, such as glass in windows or bricks for building – identifying what is suitable or unsuitable • knowing and explaining how the shape of everyday materials can be changed, for example by squashing, bending, twisting and stretching • explaining how significant scientists have made useful things from knowing about the properties of materials, such as Charles Macintosh 	<p><i>Year A: Rocks</i></p> <ul style="list-style-type: none"> • knowing and explaining that rocks can be grouped together on the basis of their appearance and properties • knowing and explaining how rocks are formed • knowing and explaining what a rock is and what is not a rock • knowing and explaining different types of rock, such as igneous, sedimentary and metamorphic rock • knowing and explaining how fossils of animals and plants are formed • knowing and explaining the different types of fossils, including body and trace fossil • knowing and explaining what soil is made from • knowing and explaining the different types of material that make up soil, including rocks and organic matter <p><i>Year B: States of Matter</i></p> <ul style="list-style-type: none"> • knowing and explaining what matter and state means • being introduced to simple models that explain what particles are • knowing and explaining the difference between solids, liquids and gases, such as solids hold their shape, liquids form a pool not a pile and gases escape from an unsealed container • observing and knowing that some materials change state when they are heated or cooled, such as water evaporating or butter melting • knowing and using Celsius as a measure of temperature 	

	Keys stage 1	Lower key stage 2	Upper key stage 2
		<ul style="list-style-type: none">• knowing and explaining the part played by evaporation and condensation in the water cycle• observing, knowing and explaining how the rate of evaporation is associated with temperature	