Year Five

During Year 5 children develop the skills of working scientifically through 3 units:

Year	Questioning & Enquiry	Observing and Measuring	Investigating	Recording & Reporting Findings	Identifying & classifying	Conclusions	Key Vocab
5	Take systematic and accurate measurements with increasing accuracy using a range of different units (mass, time, weight, area) Identify what data needs to be collected and choose the most appropriate equipment to use	Start to use test results to make predictions and set up further comparative and fair tests Identify independent and dependent variables in an investigation	Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys and graphs.	Begin to record data and results of increasing complexity using scientific diagrams and labels, classification keys and graphs.	Learn to develop keys and other information records to identify, classify and describe living things and materials	Begin to draw conclusions based on their data, observations and scientific evidence, using their findings to make predictions and to set up further comparative tests	**Plan** **Variable** **Accuracy** **Precise** **Repeat readings** **Scientific diagram** **Classification key** **Scatter graph** **Line graph**
				Week 24 Statistics I can solve comparison, sum and difference problems using information presented in a line graph I can complete, read and interpret information in			

				tables, including timetables I can select an appropriate way of presenting data graphically explaining the reasons for my choice			

Unit 1 (Autumn Term): Properties and Changes of Materials

Connections to other science units: This is the third unit children encounter which is in Year 1 (everyday materials) and Year 4 (states of matter).				
Properties and changes of materials **Year Five**	**Compare/group together materials based upon their properties** > 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 **Changing properties of a material (solid-liquid); Reversible changes of state of matter**	**I can use the vocabulary linked to properties and changes of materials** **I can identify the properties of a range of materials** **I can use the terms reversible and irreversible changes and relate them to solids, liquids and gases**	**Property** **Hardness** **Solubility** **Transparency** **Electrical Conductivity** **Thermal Conductivity** **Magnetic** **Non-magnetic** **Reversible** **Irreversible** **Soluble** **Insoluble** **Solution** **Mixture** **Substance** **Filter** **Sieve**	Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. **Note:** Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them. Safety guidelines should be followed when burning materials. **Pupils might work scientifically by:** Carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could

	>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 >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. >give reasons, based on evidence from comparative and fair tests, for the particular	**I can describe reversible and irreversible changes using diagrams** **I understand that materials are made out of particles, and I can describe their movement in different states of matter** **I can describe some separation techniques of materials**	**Evaporate** **Melt** **Dissolve** **Transparent** **Translucent** **Opaque** **Comparative test** **Fair test**	observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials. **Examples of activities:** >Children investigate the properties of different materials. They predict and then investigate whether the materials are electrical conductors, transparent, strong thermal conductors or magnetic. They record their results in a table, and then complete a Venn diagram containing two intersecting sets, choosing 2 properties by which to group the materials. >Children learn that when a solute dissolves in a solvent to create a solution, its particles spread out so that they can no longer be retrieved by filtering. They investigate whether sand, sugar, salt, flour or iron filings will dissolve in water. They record their results in a table and then display the results in a single-set Venn diagram. They consider how they could separate the mixtures and solutions. >Children learn about the 6 methods of separating solutions – picking out by hand, decanting, sieving, filtering, magnetism, and evaporation. They consider 6 different mixtures/solutions and discuss the best way to separate them. They attempt to separate them using their chosen methods. They discuss whether their method worked and why. >Children learn about the origins of post-it notes, wrinkle-free cotton, polar fleece or Gore-Tex. They write an information text, showing when and whom they were invented, their advantages/disadvantages and their application. >Children investigate different physical changes in materials. They identify whether they can be easily reversed or are in fact irreversible and explain how and why. **Links to websites for additional activities:** https://www.stem.org.uk/resources/community/collection/12742/year-5-properties-materials

	uses of everyday materials, including metals, wood and plastic			https://www.hamilton-trust.org.uk/science/year-5-science/changes-materials-changing-materials-education-pack/
Common misconceptions				Lots of misconceptions exist around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical/chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but it is no longer a loaf. The shape, but not the material, has been changed. Some children may think: • thermal insulators keep cold in or out • thermal insulators warm things up • solids dissolved in liquids have vanished and so you cannot get them back • lit candles only melt, which is a reversible change.

Unit 2 (Spring Term): Living Things and their Habitats

Connections to other science units: This is the third unit children encounter which is in Year 1 and Year 4 (living things and their habitats)				
Living things and their habitats Year Five	**Life Cycles** >describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird **Life Processes**	**I can use appropriate scientific vocabulary to identify, name and classify different animals** **I can describe life cycles of different animals**	**(revisit Y1 vocab animal types)** **Life cycle** **Chrysalis** **Pupae** **Caterpillar** **Larva**	Pupils should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. They should find out about the work of naturalists and animal behaviourists, for example, David Attenborough and Jane Goodall. Pupils should find out about different types of reproduction in animals. Pupils should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates

	>describe the life process of reproduction in different animals. **Classification** >describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals >give reasons for classifying plants and animals based on specific characteristics.	**I can explain the different stages of reproduction in a range of animals** **I can make comparisons between the stages of growth of different animals (including humans)**	**Reproduction** **Characteristic** **Vertebrate** **Invertebrate** **Classification** **Microorganism**	(such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. **Pupils might work scientifically by:** >observing and comparing the life cycles of animals in their local environment with other animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. >They might observe changes in an animal over a period of time (for example, by hatching and rearing chicks), comparing how different animals reproduce and grow. >using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system. **Examples of activities:** > Through a 2-player game, children explore different ways of sorting animals according to their life cycles. Using 9 challenge cards containing descriptions such as 'undergo metamorphosis' and 'are eusocial', children sort 10 different animals. They discuss which grouping was most difficult and attempt to create their own challenge cards. > Children learn about the purpose of a flower and its basic structures, including petal, anther, sepal, carpel, stigma, style, ovary, pollen grain, pollen tube and ovule. They label a diagram of a flower and carpel and complete an explanation text showing how flowering plants reproduce. > Children learn that, unlike animals, pieces broken off from plants can grow into another individual organism. They learn that this is used by farmers to create many crops with identical characteristics (such as planting potato tubers). By cutting up a plant such as a potato or tomato plant, children investigate which parts will grow into a new individual. >Children take cuttings from a basil plant to show how plants can grow by asexual reproduction > Children learn that animals reproduce sexually and each individual has a male and a female parent from which they inherit various traits. Children explain the process of

				animal reproduction, including the stages of sperm and egg production, mating, fertilisation, and the growth of a zygote into an embryo. **Links to websites:** https://www.hamilton-trust.org.uk/science/year-5-science/living-things-and-their-habitats-art-living/?gclid=EAIaIQobChMI3dCknO2Z6QIVh7PtCh24VQSYEAAYAiAAEgI7n_D_BwE https://www.stem.org.uk/resources/community/collection/12775/year-5-living-things-and-their-habitats
Common misconceptions:				Some children may think: • All plants start out as seeds • All plants have flowers • Plants that grow from bulbs do not have seeds Only birds lay eggs.

Unit 3 (Summer Term): Earth and Space

Earth and Space **Year Five**	**Solar System** >describe the movement of the Earth, and other planets, relative to the Sun in the solar system **Earth & Moon** >describe the movement of the Moon relative to the Earth >describe the Sun, Earth and Moon as approximately spherical bodies	**I can use key vocabulary to talk about the solar system** **I can name the planets in our solar system** **I know that the sun is a star at the centre of our solar system** **I can use a model/diagram to explain the movement of the planets to the sun/moon to the Earth**	**Solar System** **Sun** **Moon** **Star** **Orbit** **Rotate/Rotation** **Eliptical** **Day** **Night** **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**	Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). **Note:** Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses. Pupils should find out about the way that ideas about the solar system have developed, understanding how the geocentric model of the solar system gave way to the heliocentric model by considering the work of scientists such as Ptolemy, Alhazen and Copernicus. **Pupils might work scientifically by:**

	Day & Night >use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	**I know how the rotation of the Earth causes day and night to occur** **I understand how ideas have changed through history about how the solar system is constructed**	**Pluto** **dwarf planet**	Comparing the time of day at different places on the Earth through internet links and direct communication; creating simple models of the solar system; constructing simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; finding out why some people think that structures such as Stonehenge might have been used as astronomical clocks. **Examples of activities:** >Children learn about 3 different planet classifications - terrestrial, gas giant, and ice giant. They carry out a networking activity where each child has a sheet containing incomplete information and they find out the missing data from their friends. They discuss various ways of comparing, grouping and ordering the planets. >Children learn that ancient astronomers developed the geocentric model because it was the best explanation available at the time. They learn that the heliocentric model superseded it for scientific reasons - because it agrees more closely with observations. Children cut out pictures of the Sun and the eight major planets of the solar system and use them to complete a diagram by placing them in order of distance from the Sun. >Children learn about 3 different planet groups - terrestrial, gas giant, and ice giant. Children look at diagrams of the planets which are in proportion to one another. They use an 'Earth ruler' to measure the diameter of the planets in Earth diameters in order to compare them to the Earth. They then use a ruler marked in cm to measure the diameter, before using a formula to calculate their true size. They record their data in a table and look for patterns. Children can use the planet diagrams to make a display. > Children learn that day and night are caused by the rotation of the Earth, and that the Sun only appears to move across the sky. Using a split pin, children create a moving model showing how the rotation of the Earth causes day and night. They move their model through a day and night cycle, using speech bubbles to explain what they would experience at each stage of the cycle. > Using a template, children cut out and assemble their own sundial. They carefully attach the gnomon (shadow caster). On a sunny, rain and wind-free day, children calibrate their sundial by fixing it in position and marking where the shadow of the gnomon falls at 9am, 10am, 11am, 12pm, 1pm, 2pm and 3pm. Children predict where the 4pm shadow line would fall. **Links to websites for additional activities:**

				https://www.bbc.co.uk/bitesize/topics/zkbbkqt https://www.stem.org.uk/resources/community/collection/12347/year-5-earth-and-space https://www.hamilton-trust.org.uk/science/year-5-science/earth-and-space-space-presenters/
Common misconceptions:				Some children may think: • the Earth is flat • the Sun is a planet • the Sun rotates around the Earth • the Sun moves across the sky during the day • the Sun rises in the morning and sets in the evening • the Moon appears only at night • night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.