Heather Garth Primary Academy
Stars Aiming High

Year 5 Science Medium Plan

Y5	**Animals Including Humans** This unit is where pupils study animals, including humans, as part of the discipline of **biology** - the study of living **organisms.** In this Year 5 unit, pupils learn about the changes a human goes through as they develop across their lifetime. Pupils describe the changes as humans mature to old age and draw a timeline to indicate stages in the growth and development. Pupils learn what older people need to stay healthy and the difficulties they may face, including memory loss and a weakened immune system, as a result of old age. New learning includes the gestation period and life expectancy of different species of animals. This unit is the precursor to work in Year 6 as pupils learn about the circulatory system.	
National Curriculum (End of Unit Outcomes)	**Sequence of Learning (small steps)**	**Key skills – Working Scientifically**
Describe the changes as humans develop to old age	-To know that human development begins as fertilized eggs which develop into embryos and then babies. -To know that the next stages of human development see babies develop into infants and then young children. Children then develop into adults during adolescence. -To know that during adolescence humans become physically capable of reproduction. -To explain the changes that occur in boys and girls during puberty. -To know that as adults develop into old age they experience changes which may require them to move more carefully and rest more frequently. -To draw or write these on a timeline. -To explain how babies grow rapidly when they are young and why they are reliant on their parents. -To explore the changes that happen in bones and eyesight in the later stages of life.	**Researching** Explore the gestation periods of animals and compare these with humans using evidence from secondary sources. WS 6 **Pattern Seeking** Pose the statement 'The bigger the animal, the longer the gestation period' and allow children to take note of any patterns in size and gestation that could answer this. WS 1 Posed questions related to children's age and height – e.g. the older the child the taller they are.
Vocabulary	Offspring Baby/toddler/child/adolescent/ Teenager/adult develop, Egg, Fertilized egg, Embryo, Hormones, puberty, change, lifespan, gestation period	
Common Misconceptions	Some children may think: - a baby grows in a mother's tummy - a baby is "made".	

Key Questions	- What are the stages of human development? (babies to elderly) - What changes might people need to make when they reach old age? - How might a person look different as they reach the different stages of development in their life? E.g. How would someone in old age look different to an adult or how would a baby look different to a child? - What does it mean when we say babies may be reliant on their parents? - What is a gestation period? - What is a lifespan?

Y5	**Earth and Space** This unit is the last of three science units where pupils study **forces** as part of the discipline of **physics** - the study of the processes that shape our world and how we use it**.** There are also many links to the discipline of **chemistry** - the identification of the properties a substance is made from. In this Year 5 unit, pupils describe the Sun, Earth and Moon as approximately spherical bodies. New learning includes knowing about the movement of the Earth, and other planets, relative to the Sun in the solar system. Pupils learn the movement of the Moon relative to the Earth. By the end of the unit, pupils use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. This unit is the precursor to work studied in KS3 when pupils continue to study **forces** as part of the discipline of **physics.** The knowledge acquired in this unit will help pupils as they learn more about forces and movement, including measuring forces.

National Curriculum (End of Unit Outcomes)	**Sequence of Learning (small steps)**	**Key skills – Working Scientifically**
Describe the movement of the Earth and other planets relative to the sun in the solar system	-To know that the Sun is a star -To know that the Sun is at the centre of our solar system. -To understand that the Sun and the objects that orbit it are collectively known as our Solar System -To know that there are eight major planets in our solar system (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune) -To know that Pluto was reclassified as a 'dwarf planet'. -To know that all the planets in the solar system travel around the Sun in fixed orbits and that the further away they are from the Sun, the longer their orbit -To know that the Earth takes 365 ¼ to complete its orbit around the Sun. -To know it was once thought that everything orbited the Earth (geocentric model).	**Researching** Identifying scientific evidence that has been used to support or refute ideas or arguments – models of the solar system WS 6

	-To know that the work of scientists such as Copernicus, Ptolemy and Galileo developed our understanding of the heliocentric model (where the planets revolve around the Sun).	
Describe the movement of the moon relative to the Earth	-To understand that a moon is a celestial body that orbits a planet. -To know that the Earth has one moon which takes about 28 days to complete its orbit. -To know that a satellite orbits a planet and that moons are natural satellites -To know that humans have sent man-made satellites into orbit that assist with telecommunication. - To know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses; these are called phases of the Moon - To know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon	
Describe the sun, Earth and moon as approximately spherical bodies	-To know that a celestial body is a large object in the universe. -To know that a planet (e.g Earth) is defined as a spherical celestial body that orbits a star. -To know that the Sun, Earth and Moon are approximately spherical.	
Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky	-To know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit. -To know that it takes 24 hours to complete one full rotation around its axis. -To know that as the Earth rotates half faces the Sun (day) and half is facing away from the Sun (night). -To know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area. -To know that it is not safe to look directly at the sun even when wearing sunglasses. (recap from y3)	**Observing over time** Measure shadows throughout the day WS 2 **Researching** Researching to compare the time of day at different places on the Earth through internet links and direct communication WS 5
Vocabulary	Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune), spherical, solar system, rotates, star, orbit, planets	

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.
Key Questions	- What makes up the solar system? - What is the name of the star in the solar system? - Do all the planets orbit the sun in the same amount of time? How might a planet that is closer to the sun be different to one that is further away? - What shape (approximately) are the Earth, Sun and Moon? - What causes day and night? - What is a satellite? Can you name a natural satellite?

Y5	**<u>Living Things and their Habitats</u>** This unit is where pupils learn about plants and animals as part of the discipline of biology- the study of living organisms. Pupils have a secure knowledge of the functions of the different parts of flowering plants and the requirements of plants for life and growth. They know how water is transported within plants and the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. Pupils can identify and name a variety of living things in their local and wider environment and use classification keys to help group plants and animals. In Year 5, pupils revise their prior knowledge of food chains, identifying producers, predators and prey. New learning includes knowing particular species of animals and plants and describing the differences in the life cycles of a mammal, an amphibian, an insect and a bird. Pupils further develop their knowledge of the seven life processes. The knowledge acquired in this unit will help pupils understand the life process of reproduction in some plants and animals. This is the precursor to work studied in Year 6 when pupils study Linnaean classification, adaptations and sexual reproduction in plants and animals.	
National Curriculum (End of Unit Outcomes)	**Sequence of Learning (small steps)**	**Key skills – Working Scientifically**

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird	-To observe and question life cycles in the local environment e.g. plants in the quad area or playground area. -To know that animals have offspring which grow into adults. -To know that mammals' offspring will be born live such as babies or kittens and will then grow into adults. -To know that other animals may lay eggs such as chickens (birds) or snakes (reptiles) which then hatch to young and then grow to adults. -To know that some animals undergo a further change called metamorphosis before becoming an adult such as caterpillars to butterflies (insects) or tadpoles to frogs (amphibians). -To understand the work of naturalists and animal behaviourists such as David Attenborough or Jane Goodall.	**Classifying** Classify animals according to their life cycle – some use of classification keys may help this. WS 3 **Observing Over Time** Observing changes in an animal over a period of time by hatching chicks (online resources if not able to get in school) WS 6 Life cycles could then be compared with life cycles of plants and animals around the world – present findings about the different life cycles. WS5
Describe the life process of reproduction in some plants and animals	-To understand that plants and animals reproduce (produce offspring) as part of their life cycle. -To know that most animals reproduce sexually, where two parents are involved. (e.g. dogs – a fertilised egg develops inside the female and is then born as a puppy.) -To know that plants reproduce both sexually and asexually. -To understand that asexual reproduction only involves one parent plant. (Bulbs, tubers, runners and plantlets are examples of asexual plant reproduction). -To understand that sexual reproduction in plants occurs through pollination (recap from year 3), usually involving wind or insects. -To know that flowers exchange pollen grains from the anther to the stigma (often through pollinators such as insects) in a process called pollination. -To know that after pollination a process called fertilisation occurs inside the plant and a seed is produced which is then dispersed.	**Observing over time** Grow from cuttings and observe whether they grow WS 1 (variables) roots/stem/ leaf/flower. (Observe strawberry/spider plants through the year.) **Researching** Research how gardeners asexually reproduce plants. WS 6
Vocabulary	Reproduce, Sexual, Fertilises, Egg, Asexual, Plantlets, Cuttings, Offspring	

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.
Key Questions	- What are some key characteristics of mammals/insects/reptiles/bird/amphibian? - What are the main stages of the life cycle of a mammal/insect/reptile/bird/amphibian? - What is metamorphosis? - How are the life cycles of different animals similar and different? E.g. a mammal and an insect. - What is the process called by which plants would reproduce/produce a seed?

Y5	**Forces** This unit is the second of three science units where pupils study **forces** as part of the discipline of **physics** - the study of the processes that shape our world and how we use it**.** There are also many links to the discipline of **chemistry** - the identification of the properties a substance is made from. Pupils have a secure knowledge of resistance and friction, are able to compare how things move on different surfaces and know that applying forces to objects can change their shape. In Year 5, pupils revise and build upon previous learning on magnetism. They know some forces need contact between two objects, but magnetic forces can act at a distance. New learning in this unit includes knowing that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Pupils study the effects of air resistance, water resistance and friction, that act between moving surfaces. By the end of the unit, pupils will know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. The knowledge acquired in this unit will help pupils as they learn more about materials and their properties.	
National Curriculum (End of Unit Outcomes)	**Sequence of Learning (small steps)**	**Key skills – Working Scientifically**
Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object	-To know that a force causes an object to start moving, stop moving, speed up, slow down or change direction. -To know that the force that pulls things to the ground on Earth (and other planets) is called gravity. -To understand that gravity acts as a pull force making unsupported objects fall towards Earth. -To know that gravity pulls towards earth wherever you are on Earth and that if you drop something it will fall to the ground. -To know that gravity holds Earth and the other planets in their **orbits** around the Sun. (links to Earth and space unit). -To know that the force of gravity also exists on the Moon and other planets but its effect may be different. (e.g. on the moon it is not as strong and in space there is very little so people appear 'weightless'). -To know that objects with greater **mass** have a stronger force of gravity. -To understand briefly, the difference between mass and weight. -To know that Galileo Galilei and Issac Newton were Scientists involved in developing the theory of gravitation.	**Research** Investigate the work of Galileo and Issac Newton. WS 6 **Problem Solving** Which objects fall faster? Explore the effect of gravity on different objects and try to determine why certain ones may fall faster (test based on size, mass etc). - Plan an enquiry on the effects of gravity on different objects. WS1 - Recognise and control variables when testing. WS1 - Use results to make predictions and set up further tests. WS 4 Report and present findings and draw conclusions. WS 5
Identify the effects of air resistance, water resistance and friction, that act between moving surfaces	-To know that friction occurs when objects move through water or air. -To know that friction is a contact force between 2 surfaces. -To know that air resistance is a type of friction between air and another material (this is sometimes called drag). -To know that air resistance is the frictional force air exerts against a moving object.	**Comparative/fair testing** Air resistance Carrying out a scientific enquiry into air resistance - identifying and controlling variables. (Parachutes) WS1

	-To know that as an object moves, air resistance slows it down. -To understand that the faster the object's motion, the greater the air resistance exerted against it. -To understand that air resistance affects all moving objects. -To know that water resistance is another contact force that acts between moving surfaces. -To understand that there are two forces acting on an object in water – its weight and upthrust. -To know that if the weight of an object is greater than the upthrust, it sinks. To Begin to use arrows on diagrams to show the forces at work in given situations e.g. submarine in water, parachute falling, car moving on the road.	Taking measurements, with a range of scientific equipment accurately and precisely and, taking repeat readings (distance) WS 2 Recording data and results using scientific diagrams, tables and graphs. WS 3 Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations.WS 5
Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect	-To know that levers, pulleys and gears are mechanisms that allow a small force to have a greater effect. -To know that a lever is a simple mechanism used to move or lift objects. -To know how to label a diagram showing a lever, load, effort and a fulcrum or pivot. -To know that the nearer the fulcrum/pivot to the load then the less effort is needed. -To know that a seesaw works because the fulcrum is in the middle. Consider what would happen if a seesaw had the fulcrum closer to one end. -To know that gears are toothed wheels that lock together and turn each other. -To know that gears are often different sizes. -To understand that a number of gears connected together are called a gear train. -To understand that small gears rotate faster than large ones and need less effort to move. -To know that gears on a bike enable us to go faster than we could normally move without using up a lot of energy. -To know that a pulley is a device consisting of a wheel over which a rope or chain is pulled in order to lift heavy objects. -To know that when someone raises a flag up a flagpole a pulley system is used.	**Pattern Seeking** Explore the effects of levers, gears and pulleys on movement. Find patterns in the way that levers work. WS 1 Report findings to draw conclusions and explain relationships. WS 5
Vocabulary	Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears, weight, mass, upthrust	

Common Misconceptions	Some children may think: • the heavier the object the faster it falls, because it has more gravity acting on it • forces always act in pairs which are equal and opposite • smooth surfaces have no friction • objects always travel better on smooth surfaces • a moving object has a force which is pushing it forwards and it stops when the pushing force wears out • a non-moving object has no forces acting on it • heavy objects sink and light objects float.
Key Questions	- What is a contact force? - How can friction be helpful? - Can you name any other forces? - What does streamlined mean? - How could air resistance or water resistance be reduced? - How are mass and weight different? - What is a gear? How do gears work? - What is a lever? How does a lever work? - What is a pulley? How does a pulley work?

Y5	**Properties and Changes of Materials** This unit is the fifth of five science units where pupils study **materials** as part of the discipline of **chemistry** - the identification of the properties a substance is made from. In this year 5 unit, pupils further develop their knowledge as they compare and group together everyday materials on the basis of their properties, including hardness solubility, transparency, electrical and thermal conductivity. New learning includes knowing that some materials will dissolve in liquid to form a solution, and knowing how to recover a substance from a solution. This unit also builds on pupils' previous knowledge of states of matter. Pupils know that some materials change state when they are heated or cooled (e.g. evaporation and condensation in the water cycle) and associate the rate of evaporation with temperature. Pupils use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. The knowledge acquired during this unit will help pupils understand that dissolving, mixing and changes of state are reversible changes. By the end of the unit, pupils will be able to 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. This unit is the precursor to work studied in KS3 as pupils continue to learn about states of matter.	
National Curriculum (End of Unit Outcomes)	**Sequence of Learning (small steps)**	**Key skills – Working Scientifically**
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	-To identify different materials. -To understand what is meant by a material's property and describe a material based on these using key vocabulary. -To recap properties that have been covered in past years (hard, soft etc KS1, magnetic y3, electrical conductors y4 etc). -To compare and group a range of materials based on these properties. -	
Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution	- To know that solubility is the ability of a substance to dissolve - To know that dissolving is when a solid material mixes with a liquid and is no longer visible. -To understand that materials will dissolve in a liquid and form a solution. (can be done with salt or sugar) -To know that there is a limit to how much material can be dissolved in a given liquid. This is called saturation point. After this no more material will be dissolved it will be visible. -To understand that materials that don't dissolve in liquid are insoluble and form sediment.	**Comparative/ fair testing** Test solids for solubility and compare rates of Solubility – sugar or salt in water. Test irreversible changes with bicarb and vinegar and vinegar and milk. Use variables document/planning for this where children can decide how they will test this – what changes will they make and what will they measure? WS 1 and 4 (predictions) Taking measurements, with a range of scientific

	-To know that the hotter the solution the faster the dissolving process occurs. -To know that stirring a solution can speed up the dissolving process.	equipment accurately and precisely and, taking repeat readings. WS 2 Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations. Was the change reversible or irreversible e.g. melting vs burning? WS 5
Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating	-To know that solids, liquids and gases can be separated using **filtering**, **sieving** and **evaporation**. -To know the following terms: Filtering: separates an I**nsoluble** solid from a liquid. Sieving: separates solids Of different sizes. Evaporation: separating dissolved substances from liquids.	
Give reasons, based on evidence from comparative and fair Tests, for the particular uses of everyday materials, including metals, wood and plastic	- To devise their own ways to test a material's properties (use of independent and dependent support sheets for this). WS 1 - To explain the uses of a material according to its properties. - To predict what will happen and make observations.WS 4 - To know that different materials will have different purposes, based on their properties	
Demonstrate that dissolving, mixing and changes of state are reversible changes	-To know that reversible changes are changes that are not permanent. Dissolving, mixing and altering states are reversible changes. -To know that water can be altered from solid to liquid, to gas and back. Butter can be melted then will solidify. -To know that solidify means 'to become a solid' -To describe some simple reversible changes with examples. -	

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	To know that some changes result in the making of a new material, and that this is irreversible. Bread, wood, paper that is burnt cannot be returned to its original state. -To know that cooking an egg is an example of an irreversible change. -To know that adding acid to bicarbonate of soda results in the bicarbonate breaking down into salt, water and gas. The resulting product cannot be transformed back into its original form. -To know what this looks like through teacher demonstration. -To describe some simple non-reversible changes with examples.	
Vocabulary	Thermal/electrical insulator/conductor, change of state, mixture, dissolve, solution, soluble, insoluble, filter, sieve, reversible/non-reversible change, burning, rusting, new material	
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.	
Key Questions	- What do we mean by properties of materials? Can you give an example? - What are insulators? (electrical/heat) - What are conductors? (electrical/heat) - What does soluble/insoluble mean? - What does dissolving mean? - What is a solution? - What does ‘solidify’ mean? - Can you give an example of a reversible/irreversible change?	

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