# Year 5: Science

## Block 1 – Physics
## Forces

**Scientist Focus: Isaac Newton and Galileo Galilei**

| Overview of unit: | Substantive Knowledge: | Disciplinary Knowledge: |
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| In Year 5, pupils should be taught to explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. They should also be taught to identify the effects of air resistance, water resistance and friction, that act between moving surfaces and recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect. | Pupils will learn:<br>• **Unsupported objects fall towards Earth because of the force of gravity acting between Earth and the falling object.**<br>- Forces are pushes, pulls, or twists.<br>- The force of gravity pulls objects towards each other.<br>• **Air resistance, water resistance, and friction act between moving surfaces.**<br>- The force of friction acts when two objects rub against each other, slowing something down.<br>- Air resistance is a type of friction that acts on objects moving through air.<br>- Water resistance is a type of friction that acts on objects moving through water.<br>• **Some mechanisms including levers, pulleys, and gears allow a smaller force to have a greater effect.**<br>- A lever can be used to turn a small force into a bigger force. | • DC1: Ask relevant questions and use different types of scientific enquiries to answer them.<br>• DC2: Plan simple scientific enquiries.<br>• DC3: Use a range of equipment.<br>• DC4: Make careful observations.<br>• DC5: Record findings using simple scientific language, drawings, and labelled diagrams.<br>• DC7: Use results to draw simple conclusions and make predictions.<br>• DC8: Use models to represent a scientific concept or process. |

Sequence:

Pupils were first introduced to forces in Year 3 where they learned about forces as pushes and pulls and were introduced to both gravity and friction in the simplest terms. Pupils were also introduced to magnets and magnetism as a force. This unit does not cover magnets in any depth however pupils already know what magnets are, that they have two poles, how they behave towards each other, that magnetism can act without contact and that some materials are magnetic whilst others are not. Pupils also bring to this unit an understanding of the solar system therefore when the solar system, the Earth, the sun, the moon and Jupiter are referred to in this unit, it is expected that pupils will be able to access this content.

## Block 2 – Physics
## Earth and Space

**Scientist Focus: Aristotle, Ptolemy, Alhazen, Tusi, Copernicus and Galileo**

| Overview of unit: | Substantive Knowledge: | Disciplinary Knowledge: |
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| In Year 5, pupils should be taught to describe the movement of the Earth and other planets relative to the sun in the solar system. They should also | Pupils will learn:<br>• **Earth and other planets in the Solar System orbit around the Sun.** | • DC4: Make careful observations.<br>• DC5: Record findings using simple scientific language, drawings, and labelled diagrams. |

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| be taught to describe the movement of the moon relative to the Earth and describe the sun, Earth and moon as approximately spherical bodies. In addition, they should be taught to use the idea of the Earth's rotation to explain why we experience day and night and why the sun appears to move across the sky during the day. | - The Sun is a star, a huge ball of burning gas that gives off light and heat.<br>- The Solar System has eight planets: (in order) Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.<br>- The further a planet is away from the sun, the colder it is and the longer it takes it to orbit the Sun.<br>• **The Moon orbits round Earth.**<br>- The Moon does not create its own light—we see the part of the Moon that is lit by the Sun.<br>• **The Sun, Earth, and the Moon are approximately spherical bodies.**<br>- Scientists' ideas about the structure of the universe have changed over time.<br>• **The rotation of Earth results in day and night, and the apparent movement of the Sun across the sky.**<br>- Earth takes 24 hours (one day) to fully rotate on its axis. | • DC6: Present data as a bar chart.<br>• DC7: Use results to draw simple conclusions and make predictions.<br>• DC8: Use models to represent a scientific concept or process. |

Sequence:

This unit is the only required unit of study focussed on Earth and space in primary school. Pupils may have studied space in EYFS but aside from this, the links to previous learning are in Year 1 when pupils study seasons and in Year 3 pupils study light in science and biomes and climate zones in geography. From Year 1, pupils bring with them an understanding that here in the United Kingdom we experience four different seasons across the year and that the average hours of daylight change across the year. From Year 3, pupils bring with them a simple understanding of why we have night and day and how shadows change across the course of a day. The next unit in Year 5 will look at forces and in particular, gravity. This unit will support pupils in accessing that future content

## Block 3 and 4 – Chemistry
## Properties and changes of materials

| Overview of unit: | Substantive Knowledge: | Disciplinary Knowledge: |
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| In Year 5, pupils should be taught to compare and group together everyday materials on the basis of their properties. They should also know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from that solution. Pupils should use knowledge of solids, liquids and gases to decide how mixtures might be separated and should be taught to give reasons, based on evidence from | Pupils will learn:<br>• **The properties of materials include their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.**<br>- The property of a material describes what it looks like and what it does.<br>- Conductors are materials that allow heat or electricity to pass through them easily. | • DC2: Plan simple scientific enquiries.<br>• DC3: Use a range of equipment.<br>• DC4: Make careful observations.<br>• DC5: Record findings using simple scientific language, drawings, and labelled diagrams.<br>• DC6: Present data as a bar chart.<br>• DC7: Use results to draw simple conclusions and make predictions. |

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| comparative and fair tests, for the particular uses of everyday materials. In addition, pupils should 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 usually irreversible. Within this, pupils should understand the changes associated with burning and the action of acid on bicarbonate of soda. | - Magnetic materials are attracted to a magnet such as iron and steel.<br>• **The particular uses of everyday materials, including metals, wood, and plastic depend on their properties.**<br>• **Some materials will dissolve in liquid to form a solution.**<br>- If a material dissolves in water it is soluble.<br>- Temperature and stirring affect the rate a solute dissolves.<br>• **Mixtures can be separated using filtering, sieving, and evaporating.**<br>- A mixture of a solid and a liquid can be separated using filtration.<br>- A mixture of solids can be separated using sieving.<br>- Mixtures can be separated using filtering, sieving, and evaporating.<br>• **Dissolving, mixing, and changes of state are reversible changes.**<br>- An irreversible change means that, after the change has happened, the original material cannot be recovered.<br>- When a reversible change has happened, the original material can be recovered.<br>• **Changes that result in the formation of new materials are not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.** | |

Sequence:

Pupils studied materials, their properties and their uses in Year 1 and Year 2. In Year 3 they built upon this knowledge through studying the properties of rocks and their uses. In further units of study in Year 3 and Year 4, pupils discovered and investigated the following additional properties of materials: opaque, transparent, translucent, magnetic, non-magnetic, conductor and insulator. In addition, pupils bring an understanding of solids liquids and gases and this knowledge of changing states is key to accessing this unit.

## Block 5 – Biology
## Living Things and their Habitats – Lifecycles

**Scientist Focus: Jane Goodall and David Attenborough**

| Overview of unit: | Substantive Knowledge: | Disciplinary Knowledge: |
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| In Year 5, pupils should be taught to describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. They should also be taught to describe the life process of reproduction in some plants and animals. | Pupils will learn:<br>• **There are differences in the life cycles of mammals, amphibians, insects, and birds.**<br>- A life cycle is a sequence of stages in the life of a living organism.<br>- During their life cycle, insects undergo metamorphosis where they dramatically change their appearance and what they can do.<br>- Naturalists are scientists who study plants and animals in their natural habitat.<br>• **Plants and animals produce offspring by the life process of reproduction.**<br>- Eggs have to be fertilised to develop into embryos; this can occur inside or outside of an animal's body.<br>- Pollination occurs when pollen from the male part of the flower is transferred to the female part.<br>- Seeds are dispersed away from the parent plant to an area where they have space to grow. | • DC1: Ask relevant questions and use different types of scientific enquiries to answer them.<br>• DC4: Make careful observations.<br>• DC5: Record findings using simple scientific language, drawings, and labelled diagrams. |

Sequence:

Prior to this unit, pupils may have studied simple animal lifecycles in EYFS and will know about the lifecycle of a flowering plant from Year 3. In Year 2 pupils discovered that animals have offspring and in Year 4 pupils discovered that reproduction is one of the seven characteristics of life.

## Block 6 – Biology
## Animals including Humans – Growing old

| Overview of unit: | Substantive Knowledge: | Disciplinary Knowledge: |
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| In Year 5, pupils should be taught to describe the changes as humans develop as they grow old. | Pupils will learn:<br>• **Humans experience a number of changes as they develop to old age.**<br>- Human stages of development include embryo, foetus, baby, childhood, adolescence, adulthood, and old age.<br>- The gestation period (pregnancy) is the length of time a foetus develops inside the uterus.<br>- The gestation period (pregnancy) is the length of time a foetus develops inside the uterus.<br>- Puberty is the name for the physical changes that happen during adolescence.<br>- Adolescence is the stage of development in humans between childhood and adulthood, it includes both physical and emotional changes.<br>- As an adult ages, their fertility, bone mass, and brain activity decline. | • DC1: Ask relevant questions and use different types of scientific enquiries to answer them.<br>• DC5: Record findings using simple scientific language, drawings, and labelled diagrams.<br>• DC7: Report on findings from enquiries, including oral and written explanations. |
| Sequence:<br>This unit builds on pupils' knowledge of the human body and its processes and functions. Prior to this unit, pupils have studied the skeletal, muscular and digestive systems. Pupils also know that humans, like all organisms, have a lifecycle in which growing and reproduction both play an integral part. | | |