# *Science in Year 5*

## Earth and Space – Autumn 1

**National curriculum statutory requirements:**

-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.

**Working scientifically statutory requirements:**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing)** to answer questions, including recognising and controlling variables where necessary.
- use test results to make predictions to set up further comparative and fair tests.
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory)**

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: 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.

**Vocabulary**

Earth sun moon axis rotation orbit lunar cycle moon phases: waxing and waning, crescent, gibbous, new moon full moon galaxy universe constellation
Solar system: Mercury Venus Mars asteroid belt Saturn Jupiter Uranus Neptune heliocentric geocentric Copernicus Plato Aristotle Galileo sundials timezones .

# *Science in Year 5*

## Forces(Friction and Resistance) – Autumn 2

**National Curriculum statutory requirements:**

-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.

**Working scientifically statutory requirements:**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing)** to answer questions, including recognising and controlling variables where necessary.
- use test results to make predictions to set up further comparative and fair tests.
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory)**

Pupils should explore falling objects and raise questions about the effects of air resistance.
They should explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall.
They should experience forces that make things begin to move, get faster or slow down.
Pupils should explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel.
Pupils should explore the effects of levers, pulleys and simple machines on movement.
Pupils might find out how scientists, for example, Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.
Pupils might work scientifically by: exploring falling paper cones or cup-cake cases, and designing and making a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes.
They might design and make products that use levers, pulleys, gears and/or springs and explore their effects.

**Key Vocabulary**
friction gravity resistance air resistance water resistance streamlined aerodynamic up-thrust down-force Isaac Newton force meters
Newton meters opposing levers brake gears mechanism cogs pivot pulley fulcrum vinyl

# *Science in Year 5*

# Properties and changes of materials - Spring 1

## (Dissolving and evaporating; reversible and irreversible)

**National Curriculum statutory requirements:**

-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.
**Observation throughout the year:**
-pupils should study and raise questions about their local environment throughout the year.
-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.

**Working scientifically statutory requirements:**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing**) to answer questions, including recognising and controlling variables where necessary
- use test results to make predictions to set up further comparative and fair tests
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs,
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory)**

Pupils 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. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.
**Note:** 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 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.

**Vocabulary:** particles atoms reversible changes irreversible evaporating filtering filtration dissolving condensation precipitation soluble insoluble solution rigid durable flexible permeable absorbent thermal conductor electrical conductor

# *Science in Year 5*

# Properties and changes of materials – Spring 2

## (Dissolving and evaporating; reversible and irreversible)

**National Curriculum statutory requirements:**

-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.

**Observation throughout the year**

-study and raise questions about their local environment throughout the year.
-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.

**Working Scientifically statutory requirements :**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing)** to answer questions, including recognising and controlling variables where necessary.
- use test results to make predictions to set up further comparative and fair tests.
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs,
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory)**

Pupils 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.

They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.

**Note:** 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 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.

**Vocabulary:** solids, liquids, gas, particles, atoms, compact, loose, reversible changes, irreversible, frozen, ice, evaporating, filtering, sieving, melting and dissolving, condensation, hardness, soluble, insoluble, recover, solution, absorbent

# *Science in Year 5*

## Living things and their habitats - Summer 1
## (Life Cycles & Reproduction)

**National Curriculum statutory requirements:**

-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.
**Observation throughout the year**
-Pupils should study and raise questions about their local environment throughout the year.
-They should observe life-cycle changes in a variety of living things, for example, plants in the vegetable garden and animals in the local environment.

**Working scientifically statutory requirements:**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing)** to answer questions, including recognising and controlling variables where necessary
- use test results to make predictions to set up further comparative and fair tests
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory**)
Pupils should study and raise questions about their local environment throughout the year. They 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, including sexual and asexual reproduction in plants, and sexual reproduction in animals.
Pupils might work scientifically by: observing and comparing the life cycles of plants and animals in their local environment with other plants and 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 try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. 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.

**Vocabulary**
stamen anther ovary ovule petal filament sepal spores sexual asexual reproduction seed dispersal pollen pollination cross-pollination germination oxygen photosynthesis embryo cuckoo mason bee fly honey bee pupate larvae

# *Science in Year 5*

## Animals including humans - Summer 2
## (Growing and changing)

**National Curriculum statutory requirements:**

- describe the changes as humans develop to old age.

**Working scientifically statutory requirements:**

- plan different types of scientific enquiries (**Pattern seeking, research, observations over time, identifying & classifying, comparative and fair testing)** to answer questions, including recognising and controlling variables where necessary.
- use test results to make predictions to set up further comparative and fair tests.
- take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- report and present findings from enquiries, including conclusions, causal relationships and explanations, results, explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identify scientific evidence that has been used to support or refute ideas or arguments.

**Notes and guidance (non-statutory**)

Pupils should draw a timeline to indicate stages in the growth and development of humans.
They should learn about the changes experienced in puberty.
Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.

**Vocabulary**

foetus development offspring gestation conception embryo period nutrition genetics DNA illness disability toddler pre-school adolescent teenager offspring puberty perspiration

# *Science in Year 5*