# Cantrell Primary School Science Curriculum

## Year 5: Working Scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

**5.1** planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

**5.2** taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

**5.3** recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

**5.4** using test results to make predictions to set up further comparative and fair tests

**5.5** reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

**5.6** identifying scientific evidence that has been used to support or refute ideas or arguments.

# Cantrell Primary School Science Curriculum

## Year 5: How do forces change the way objects move?

*NC reference: Forces*

**Objectives:**

*- 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*

**Key Factual Learning:**

- ✓ A force is a push or pull. It changes the way an object moves.
- ✓ Some forces are balanced and some are unbalanced.
- ✓ Weight and mass are different things.
- ✓ Weight (measured in N) is the force of gravity pulling down upon an object.
- ✓ Mass (measured in KG) is the amount of stuff inside (matter).
- ✓ Isaac Newton discovered gravity. (Newton's Law of Gravity) He discovered it by watching an apple fall from a tree and began to ask questions about why this was.
- ✓ Air resistance is the force that pushes against gravity.
- ✓ Water resistance is the force that pushes against a moving object under water.
- ✓ Simple machines and mechanisms include pulleys, gears and levers.
- ✓ These can be used to turn a smaller force into a larger force.

**Practical Tasks (Working Scientifically):**

- Identify balanced and unbalanced forces **5.6**
- Measure the weight and mass (in N and KG) of objects around the classroom and found the link. **5.1 5.2 5.3**
- Read and comprehend information about Isaac Newton. **5.6**
- Make an information poster all about Sir Isaac Newton. **5.6**
- Investigate the effects of air resistance by experimenting with mini parachutes and through research **5.5**
- Investigate the effects of water resistance and up thrust and how it affects moving objects **5.5**
- investigate the effects of a pulley lifting heavy objects **5.1 5.2**
- Explore and design mechanisms that use levers, pulleys and gears **5.5 5.6**

**Key Vocabulary:**

forces, push, pull, balanced, unbalanced, gravity, friction, air resistance, reaction force, water resistance, equal, Isaac Newton, newtons, newton meter, weight, mass, parachute, up thrust

**Cross-Curricular Links:**

Design and make a WW1 parachute and investigate the effects of air resistance.
Links to weight and mass in Maths

# Cantrell Primary School Science Curriculum

## Year 5: How can materials be changed reversibly or irreversibly?

*NC reference: Properties of materials*

### Objectives:

*- 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*
*- 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.*

### Key Factual Learning:

- ✓ Materials can be described using different words such as thermal, flammable, flexible, reflective, permeable, translucent, hard, transparent, absorbent.
- ✓ Thermal insulators are materials which hold in heat and thermal conductors allow heat to travel through them easily.
- ✓ Solids, liquids and gases can be separated through sieving, filtering and evaporating.
- ✓ A thermal insulator keeps the temperature constant.
- ✓ Dissolving and melting are not the same. Melting is caused by heat.
- ✓ Soluble means that the solid will dissolve into a liquid completely.
- ✓ Insoluble means that the solid will not dissolve into a liquid completely.
- ✓ Heat can speed up the dissolving process.
- ✓ If a process is reversible, it can be changed back to its original state. If it is irreversible, it cannot.

### Practical Tasks (Working Scientifically):

- Name and sort materials based on their properties, checking for understanding of vocabulary
- Test different materials investigating their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. They will answer yes or no when testing the materials and record on a chart. **5.1-5.5**
- Sort objects into thermal conductors and thermal insulators. **5.3**
- Investigative soluble and insoluble materials – making predictions first and then testing if they dissolve in water. **5.1-5.3**
- Separate various materials by sieving, filtering or evaporating. **5.1-5.6**
- Investigate whether a solution is reversible or irreversible depending on the material. **5.1-5.5**
- Investigate factors which speed up the dissolving process. **5.1-5.3**
- Sort a range of processes into reversible and irreversible. **5.3**

### Key Vocabulary:

Properties, hardness, solubility, transparency, conductivity, thermal, magnets, dissolve, liquid, substance, solids, gases, filtering, sieving, evaporating, fair test, metals, wood, plastic, mixing, changes of state, reversible change, irreversible change, soluble and insoluble.

### Cross-Curricular Links:

Design and Technology : cookery- making biscuits

# Cantrell Primary School Science Curriculum

## Year 5: Where is the Earth in Space?

*NC Reference: Earth and Space*

**Objectives:**

*- 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*

**Key Factual Learning:**

- ✓ The Sun, Earth and Moon are approximately spherical. In the past, people thought the Earth was flat.
- ✓ There are 8 planets in our solar system: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. These travel around the Sun in fixed orbits.
- ✓ The Sun is a star. It is at the centre of our solar system. Geocentric means Earth centred and Heliocentric means Sun centred.
- ✓ Earth takes 365¼ days to complete its orbit around the Sun.
- ✓ The Earth rotates (spins) on its axis every 24 hours.
- ✓ As Earth rotates half faces the Sun (here it is day) and half is facing away from the Sun (night).
- ✓ As the Earth rotates the Sun appears to move across the sky. In fact, the sun is not moving, it is the Earth that is orbiting the sun.
- ✓ The Moon orbits the Earth. It takes about 28 days to complete its orbit.
- ✓ The world is made up of different time zones. GMT is the time zone we are in and all other times can be calculated according to this.

**Practical Tasks (Working Scientifically):**

- Investigate theories of the past that indicate the Earth was flat. **5.6**
- Analyze information, articles and non-fiction texts to dispute the fact that the Earth was flat. **5.6**
- Explain the idea that planets are actually spherical, not flat **5.6**
- Research the order and related facts about the planets using a range of non-fiction books. Making a poster to inform. **5.6**
- Sort information about Ptolemy and Copernicus and research their theories about how the planets move within the solar system. **5.6**
- Describe how the movement of the Earth and the Moon create night and day. **5.5**
- Explore different time zones around the world using tables and charts. **5.3, 5.6**
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**Key Vocabulary:**

Earth, Sun, Moon, (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, solar system, rotates, star, orbit, planets, Ptolemy and Copernicus, heliocentric, geocentric

**Cross-Curricular Links:**

Geography topic – Continents, counties and cities
Reading comprehension skills taught through the non-fiction books (research)
Creative homework is linked to knowledge of each of the planets.

# Cantrell Primary School Science Curriculum

## Year 5: What are the different stages of life?

*NC Reference: Living things and their habitats*

**Objectives:**

*- 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.*

### Key Factual Learning:

**Plants**

- ✓ The stamens produce fine, dust-like grains, called pollen, and the carpels produce ovules. The male and female parts are surrounded by the petals of the flower. In many flowers, it is the job of the petals to attract insects, so that pollen can be transferred to other flowers. This process is called pollination.
- ✓ Most plants require seeds to reproduce.
- ✓ There are different methods of growing new plants from a parent plant e.g. seeds, stems, root cuttings, bulbs, tubers

**Animals**

- ✓ A life cycle is a diagram showing the various stages of an animal, plant or animal life
- ✓ Amphibians, mammals, insects and bird life cycles have some similarities and differences
- ✓ Endangered animals are being helped by humans to complete their life cycles.
- ✓ Most animals reproduce sexually. This involves two parents where the sperm from the male fertilises the female egg.
- ✓ Animals including humans have offspring which grow into adults.

### Practical Tasks (Working Scientifically):

**Plants**

- Revise the reproductive structures of a flower. Label the various parts, describing their jobs and using the scientific names. **5.5**
- Draw the life cycle of a flowering plant
- Use secondary sources to find out about wind and insect pollination. Create a poster on how plants reproduce. **5.5, 5.6**
- Observe a plant growing over time from other methods than seeds e.g. growing from bulbs, cuttings, tubers and record information and plot on a scatter/line graph. **5.1 create a life cycle of a non flowering plant**

**Animals**

- Compare, contrast and sort different life cycles of mammals, amphibians, birds, plants and humans. **5.5**
- Group a mixture of animals including amphibians, insects and birds. **5.5**
- Invent their own animal and describe their life cycle **5.6**
- Observe and describe the life cycle of an insect, amphibian (frog), using a cyclical diagram to show this. Use this to move onto the life cycle of a butterfly (metamorphosis) **5.2**
- They research and create a fact file on Jane Goodall who helps secure the numbers of chimpanzees in the world. **5.6**
- Make comparisons between three life cycles using a Venn diagram. Identify and label the parts of an egg. **5.5**
- Describe the life processes of the reproduction of mammals. **5.5**
- Investigate the gestation periods of different mammals and compare. **5.5**

### Key Vocabulary:

Life cycle, reproduce, sexual, sperm, fertilises, egg, live young, metamorphosis, asexual, plantlets, runners, bulbs, cuttings, gestation, mammal, amphibian, bird, reptile, warm blooded, cold blooded

### Cross-Curricular Links:

SRE topic

# Cantrell Primary School Science Curriculum

## Year 5: How do humans change as they get older?

*NC Reference: Animals, including humans*

**Objectives:**

*- describe the changes as humans develop to old age (includes non-recorded work in SRE)*

**Key Factual Learning:**

- ✓ Humans follow a life cycle also. We are born, hit puberty, reproduce and then die.
- ✓ Humans are mammals.
- ✓ Human gestation lasts 9 months.
- ✓ Other mammals have longer or shorter gestation periods.
- ✓ When babies are young they grow rapidly. They are very dependent on their parents. As they develop they learn many skills.
- ✓ At puberty, a child's body changes and develops primary and secondary sexual characteristics. This enables the adult to reproduce.
- ✓ Girls experience changes to their bodies in order to fulfil their life cycle – this includes menstruation and the development of female reproductive organs.
- ✓ Boys also experience changes to their bodies to fulfil their life cycle. This includes the development of the male reproductive organs. This then leads to the ability to reproduce.
- ✓ Emotional changes occur within puberty also.

**SRE scheme of work**

- ✓ Puberty occurs sometime between the ages of 8 and 16.
- ✓ Male and female sex hormones become very active and are responsible for growth and development during puberty.
- ✓ Puberty changes are a normal part of growing up.
- ✓ Each person will start puberty at a slightly different time and will develop in their own way – it's important to respect these differences.
- ✓ Some changes happen only to males, some only to females; some happen to both.
- ✓ The whole process of change can take a few years.

**Practical Tasks (Working Scientifically):**

- Identify the stages of human life cycle, including puberty and pregnancy and compare the gestation lengths of different mammals. **5.3**
- Identify the stages of a human life cycle, labelling images and giving a description of various milestones. **5.3**
- Research the different gestation periods for mammals. **5.3**
- Explore the various physical and emotional changes males and females go through during puberty. **5.5**
- Label male and female reproductive organs. **5.5**
- Play the menstrual cycle card game. **5.5**

**SRE lessons**

- Explore menstrual sanitary products and understand their specific jobs (tampons, sanitary towels etc).
- Share a variety of puberty problem scenarios as a class and discuss ways they could help
- Explain how to keep clean during puberty.
- Ask questions about puberty with confidence
- Describe the changes as humans develop into adults and through to old age.

**Key Vocabulary:**

Development, old, young, mature, immature, adolescent, puberty, babies, reproductive organs, menstruation, periods

**Cross-Curricular Links:**

Life cycles research within reading sessions and internet research

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