

Pear Tree Science Curriculum

The nature, processes and methods of science

Working Scientifically at Pear Tree

Seeking answers to questions through collecting, analysing and presenting data.

- **exploring**
- **identifying, classifying and grouping**
- **observing over time**
- **pattern seeking**
- **comparative and fair testing**
- **making things**

plus

- **researching using secondary sources.**

Big Investigations and Mini Investigations, those Magic Moments.

Examples

Exploring

Asking questions

What happens when different liquids are added together?

Can I get the light bulb to come on?

Collecting variables.

identifying, classifying and grouping

What is similar about these materials?

How can we group these invertebrates?

What plants can we find in the hedge?

Observing over time

How long will it take for the pears to grow from blossom?

Growing crystals.

Pattern Seeking

Do dandelions in the shade have longer leaves than those in the light?

Where do we find most snails?

Do people with longer legs jump higher?

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Comparative and Fair Testing

Which x does y best?

If we change x what happens to y?

Plan Do and Review poster

What affects the rate at which sugar dissolves?

What makes a difference to the time it takes for a paper spinner to fall?

Which is the strongest paper bag?

Making Things

Can you find a way to design a pressure pad switch for a burglar alarm?

How could you make a weighing machine out of elastic bands?

Researching Using Secondary Sources

Find out more about Science concepts.

Find out about a scientist and their work.

Important and interesting discoveries.

Links with Heart and Soul Policy

Social Learning – working with others

Cultural Learning – Willingness to participate in and respond positively to scientific endeavor.

Spiritual - Sense of enjoyment and fascination in learning about themselves, others and the world around them

Moral - Interest in investigating and offering reasoned views about moral and ethical issues, and being able to understand and appreciate the viewpoints of others on these issues

Health and Well Being –

- Understanding of how to stay healthy in both mind and body at all stages in their development
- Sex and relationships education
- Food and diet and body image attitude
- Drugs
- Substance misuse
- Hygiene
- Making good decisions – media and peer influence

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Key Stage 1 and EYFS

These three characteristics of effective teaching and learning, taken from **EYFS Key Principles**, form an ideal basis for **Scientific Enquiry** and should underpin **Working Scientifically**:

- playing and exploring - children investigate and experience things, and 'have a go';
- active learning - children concentrate and keep on trying if they encounter difficulties, and enjoy achievements; and
- creating and thinking critically - children have and develop their own ideas, make links between ideas, and develop strategies for doing things.

Working scientifically

Practical scientific methods, processes and skills to learn through the content for each year group.

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

Take opportunities that are presented by topic work and the curiosity of the children to investigate using this scientific method. The content below can be covered in a depth to which you deem appropriate whilst learning to work scientifically can be learned through more engaging content.

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RED

The world: children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur, and talk about changes.

(From EYFS Key Principles)

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Orange

Biology

Plants

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.

(Recognise that many plants have flowers)

Forest School / outdoor learning, **Seasonal Change**

Animals Including Humans

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

Forest School

HEALTH AND WELLBEING

Understanding of how to stay healthy in both mind and body at all stages in their development

Sex and relationships education

Chemistry

Everyday Materials

Investigate everyday materials through topic work

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

Maths – data handling

Physics

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Seasonal Changes

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

Forest School / outdoor learning Maths – measuring, **Plants**

Findings can be recorded in a variety of ways using simple scientific language.

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Yellow

Biology

Living Things and Their Habitats

- explore and compare the differences between things that are living, dead, and things that have never been alive
- identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other
- identify and name a variety of plants and animals in their habitats, including micro- habitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.

Forest School / outdoor learning, Maths – data handling

Plants

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

Forest School Maths – measuring data handling

Animals Including Humans

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

SRE PE PSHE

Chemistry

Uses of Everyday Materials

Investigate everyday materials through topic work

- identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses

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- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Maths – data handling D&T art

Findings can be recorded in a variety of ways using an increasing scientific vocabulary. Results / observations and diagrams should be recorded in a Science Notebook and used to help children communicate what they have discovered.

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Lower Key Stage 2

Working scientifically

Practical scientific methods, processes and skills to learn through the content for each year group.

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

Take opportunities that are presented by topic work and the curiosity of the children to investigate using this scientific method. The content below can be covered in a depth to which you deem appropriate whilst learning to work scientifically can be learned through more engaging content.

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Green

Biology

Plants

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

Animals Including Humans

- identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Chemistry

Rocks

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.

Geography Visit to Llandudno

Physics

Light

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by a solid object
- find patterns in the way that the size of shadows change.

Story writing and Shadow puppets make a kaleidoscope History – Victorians

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Forces and Magnets

- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials
- describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

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Blue

Biology

Living Things and Their Habitats

- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- recognise that environments can change and that this can sometimes pose dangers to living things.

Grouping plants as flowering plants and nonflowering plants.

Divide animals into vertebrates and invertebrates then group them.

Animals, Including Humans

- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey.

HEALTH AND WELLBEING

Understanding of how to stay healthy in both mind and body at all stages in their development

Food and diet and body image attitude

Chemistry

States of Matter

- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Physics

Sound

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it

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- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases

Link to music, guitar playing

Electricity

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

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Upper Key Stage 2

Working scientifically

Practical scientific methods, processes and skills to learn through the content for each year group.

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Take opportunities that are presented by topic work and the curiosity of the children to investigate using this scientific method. The content below can be covered in a depth to which you deem appropriate whilst learning to work scientifically can be learned through more engaging content.

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Indigo

Biology

Living Things and Their Habitats

- 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.

Animals Including Humans

- describe the changes as humans develop to old age.

HEALTH AND WELLBEING

Understanding of how to stay healthy in both mind and body at all stages in their development

Sex and relationships education

Chemistry

Properties and Changes of Materials

- 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.

Physics

Earth and Space

- 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.

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SPIRITUAL

Sense of enjoyment and fascination in learning about themselves, others and the world around them

Forces

- 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.

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Violet

Biology

Living Things and Their Habitats

- describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics.

Animals Including Humans

- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans.

PSHE, Life Education Bus

HEALTH AND WELLBEING

Understanding of how to stay healthy in both mind and body at all stages in their development

Food and diet and body image attitude

Drugs

Substance misuse

Hygiene

Evolution and Inheritance

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Visit to London – British Museum

Chemistry

No Requirements

Physics

Light

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye

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- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Possibility of linking or teaching with Y5 work on **Earth in Space**

Electricity

- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
- compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches
- use recognised symbols when representing a simple circuit in a diagram.

