

Whole School

Science Curriculum

Whole-school definition of science

Science is a way to understand our world by carefully thinking about it and testing our guesses with observations and experiments.

Big Ideas of Science

Curriculum Themes

'Big Ideas' of Science

The Big Ideas of Science are recurring themes that appear throughout the curriculum in all series.

Each Learning Point that is taught will link to a Big Idea.

The 'Big Ideas' focus on the 4 main components of scientific knowledge:

Physics, Chemistry, Biology and Earth Science

Big Ideas of Science

Physics

P1: The universe follows unbreakable rules that are all about forces, matter and energy.

P2: Forces are different kinds of pushes and pulls that act on all the matter that is in the universe. Matter is all the stuff, or mass, in the universe.

P3: Energy, which cannot be created or destroyed, comes in many different forms and tends to move away from objects that have lots of it.

Big Ideas of Science

Chemistry

C1: All matter (stuff) in the universe is made up of tiny building blocks.

C2: The arrangement, movement and type of the building blocks of matter and the forces that hold them together or push them apart explain all the properties of matter (e.g. hot/cold, soft/hard, light/heavy, etc).

C3: Matter can change if the arrangement of these building blocks changes.

Big Ideas of Science

Biology

B1: Living things are special collections of matter that make copies of themselves, use energy and grow.

B2: Living things on Earth come in a huge variety of different forms that are all related because they all came from the same starting point 4.5 billion years ago.

B3: The different kinds of life, animals, plants and microorganisms, have evolved over millions of generations into different forms in order to survive in the environments in which they live.

Big Ideas of Science

Earth Science

E1: The Earth is one of eight planets that orbit the sun.

E2: The Earth is tilted and spins on its axis leading to day and night, the seasons and the climate.

E3: The Earth is made up of several layers, including a relatively thin rocky surface which is divided into tectonic plates, and the movement of these plates leads to many geologic events (such as earthquakes and volcanoes) and geographical features (such as mountains.)

EYFS

EYFS Working Scientifically Overview

New learning and vocabulary

Science, experiment, test, fair, find out and explain, reason, why, record, senses

- **Know that we can ask 'Why' questions about the world and that when we observe the world to answer these questions, this is science (Ask scientific questions/To plan an enquiry)**
- **Know how to talk about what they see using a wide range of vocabulary and new vocabulary (Ask scientific questions/To observe closely)**
- **Know which resources are needed to carry out their own plan (To plan an enquiry)**
- **Know how to compare quantities using language 'more than, fewer than' (To observe closely)**
- **Develop their fine motor skills so that they can use a range of tools competently, safely and confidently (To take measurements)**
- **Make comparisons between objects relating to size, length, weight and capacity (To gather/record results)**
- **Write short sentences with words with known letter sound correspondence (To present results)**
- **Begin to describe a sequence of events, real or fictional using words such as first (To present results)**
- **Draw information from a single map (To present results)**
- **Articulate their ideas and thoughts in well-formed sentences (To present results)**

EYFS Overview

Block 1

Biology: Humans (All about us)

Block 2

Earth Science: Earth and Space (Out of this World)
Chemistry: Everyday Materials (junk modelling)

Block 3

Physics: States of Matter (Melting/Antarctica)

Block 4

Biology: Humans

Block 5

Biology: Growing

Block 6

Biology: Habitats

Year 1

Year 1/2 Working Scientifically Overview

New learning and vocabulary

properties, observe, test, magnifying glass, object, record, equipment

- **Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science**
- **Know that we can use magnifying glasses to observe objects closely**
- **Know that we can test our questions to see if they are true**
- **Know that objects can be identified or sorted into groups based on their observable properties**
- **Know that we can write down numbers and words or draw pictures to record what we find**

Year 1 Overview

Block 1

Block 2

Biology: Animals including Humans

Block 3

Block 4

Chemistry: Everyday Materials

Block 5

Earth Science: Seasonal Changes

Block 6

Biology: Plants

Year 2

Year 1/2 Working Scientifically Overview

New learning and vocabulary

properties, observe, test, magnifying glass, object, record, equipment

- **Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science**
- **Know that we can use magnifying glasses to observe objects closely**
- **Know that we can test our questions to see if they are true**
- **Know that objects can be identified or sorted into groups based on their observable properties**
- **Know that we can write down numbers and words or draw pictures to record what we find**

Year 2 Overview

Block 1

Block 2

Chemistry: Uses of Everyday Materials

Block 3

Block 4

Biology: Living Things and Life Cycles

Block 5

Block 6

Biology: Plants and Animals Including Humans

Year 3

Year 3/4 Working Scientifically Overview

Revision

properties, observe, test, magnifying glass, object, record, equipment

- **Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science**
- **Know that we can use magnifying glasses to observe objects closely**
- **Know that we can test our questions to see if they are true**
- **Know that objects can be identified or sorted into groups based on their observable properties**
- **Know that we can write down numbers and words or draw pictures to record what we find**

New learning and vocabulary – ongoing from year 3

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- **Know that we can ask questions and answer them by setting up scientific enquiries**
- **Know how to make relevant predictions that will be tested in a scientific enquiry**
- **Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same**
- **Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches**
- **Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table**
- **Know how – with structured guidance - to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion**
- **Know how to precis a scientific enquiry write-up into a brief oral discussion of what was found in a scientific enquiry**
- **Know that scientific enquiries can suggest relationships, but that they do not prove whether a prediction is true**
- **Know that scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary even, and that repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry**
- **Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)**
- **Know that they can draw conclusions from the findings of other scientists**
- **Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry**

Year 3 Overview

Block 1

Block 2

Physics: Light

Block 3

Chemistry and Earth Science: Rocks and Fossils

Block 4

Physics: Forces and Magnets

Block 5

Block 6

Biology: Plants and Animals

Year 4

Year 4 Overview

Block 1

Biology: Animals Including Humans

Block 2

Physics: Sound

Block 3

Physics: Electricity

Block 4

Chemistry: Solids, Liquids and Gases

Block 5

Block 6

Biology: Living Things and Their Habitats

Year 3/4 Working Scientifically Overview

Revision

properties, observe, test, magnifying glass, object, record, equipment

- **Know that we can ask questions about the world and that when we observe the world to answer these questions, this is science**
- **Know that we can use magnifying glasses to observe objects closely**
- **Know that we can test our questions to see if they are true**
- **Know that objects can be identified or sorted into groups based on their observable properties**
- **Know that we can write down numbers and words or draw pictures to record what we find**

New learning and vocabulary – ongoing from year 3

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

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- **Know that they can draw conclusions from the findings of other scientists**
- **Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry**

Year 5

Year 5 Overview

Block 1

Earth Science and Physics: Earth and Space

Block 2

Physics: Forces

Block 3

Block 4

Chemistry: Properties and Changes of Materials

Block 5

Block 6

Biology: Living Things and Their Habitats

Year 5/6 Working Scientifically Overview

Revision

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- Know that we can ask questions and answer them by setting up scientific enquiries
- Know how to make relevant predictions that will be tested in a scientific enquiry
- Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
- Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
- Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
- Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
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- Know that the conclusions of scientific enquiries can lead to further questions, where results can be clarified or extended to different contexts (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc)
- Know that they can draw conclusions from the findings of other scientists
- Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

New learning and vocabulary

line graph, relationship, outlier

- Know how to choose appropriate variables to test a hypothesis (e.g. plant height as a dependent variable when measuring effect of light on plant growth)
- Know how to identify conditions that were imperfectly controlled and can explain how these might affect results
- Know how to accurately use further measuring devices, including digital and analogue scales, measuring cylinders and beakers, recognizing the relative accuracy of each device
- Know how and when to repeat measurements, how to find an average of a set of measurements and how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement
- Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
- Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary
- Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)

Year 6

Year 5/6 Working Scientifically Overview

Revision

prediction, measurement, enquiry, dependent variable, independent variable, fair test, similar, theory, hypothesis

- Know that we can ask questions and answer them by setting up scientific enquiries
- Know how to make relevant predictions that will be tested in a scientific enquiry
- Know that in a fair test one thing is altered (independent variable) and one thing that may change as a result is measured (dependent variable) while all other conditions are kept the same
- Know how to use a range of equipment to measure accurately, including thermometers, data loggers, rulers and stopwatches
- Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key; how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table
- Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion
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- Know that they can draw conclusions from the findings of other scientists
- Know that a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry

New learning and vocabulary

line graph, relationship, outlier

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- Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary
- Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)

Year 6 Overview

Block 1

Physics: Light

Block 2

Physics: Electricity

Block 3

Biology: Living Things and Their Habitats

Block 4

Biology: Evolution and Adaptation

Block 5

Biology: Animals Including Humans

Block 6

Biology: Animals Including Humans

Using the curriculum
document

- Where new learning is based on previous learning, the block starts with a revision session from previous block(s)'s learning.
- Each overview includes learning points/objectives that need to be covered.
- The lesson-by-lesson knowledge may be taught and learned more flexibly than is exactly specified in the curriculum document to ensure responsive teaching.
- New vocabulary to be taught is given, along with previously taught vocabulary.
- Key concept vocabulary is in **bold**.
- Lab sessions are explained, though alternative enquiries that ensure the same breadth of coverage across a year are equally acceptable.
- A minimum of one enquiry is undertaken per block, though more can be undertaken if a teacher sees it as necessary to respond to the needs of their class.
- Enquiries can be undertaken in the science lab where required, based on a booking system.
- Completion of the enquiries should be undertake in reference to the linked 'working scientifically' learning points/objectives.