

Science: intent statement

Date: September 2022 and reviewed on an on-going basis
This Curriculum Statement sits alongside similar documents for Early Years, Reading, Writing, Maths and others.



Our curriculum intent: overall

Our curriculum intent has three layers:



Layer 1: Our schools' core aim

We want Sphere Federation schools to be happy and healthy places to learn. This core aim permeates our schools and their ethos, whether in the classroom or around and about school.
(At St James' CE Primary, this is expressed with one additional element: 'happy and healthy place to achieve and believe'.)

Layer 2: Knowledge and skills

The knowledge and skills we are required to teach are set out in The National Curriculum (Department for Education, 2014). We set these out in a year-group based sequence of learning (age-related expectations) with some additional/explicit learning. Working scientifically skills are embedded within each science unit, ensuring that children are learning about the discipline of science as well as the substantive knowledge set out in the National Curriculum. Challenge and fluency are key aspects: we search for purposeful, meaningful opportunities to challenge all pupils, to extend and deepen their learning; and we want our children to be fluent in the skill of reading and in their rapid recall of number facts, for example.

Layer 3: Attitudes

We deliver the content in ways which achieve four intentions that promote positive attitudes to learning (many of which feature in the National Curriculum Purpose of Study for each subject):

Enjoyable

We want Sphere Federation schools to be happy and healthy places to learn. The more enjoyable science is, the more engaged our pupils will be, and the more we will be able to meet the needs of all children in our school community. Hands-on practical enquiry allows children to develop both scientific knowledge and working scientifically skills in purposeful, enjoyable lessons.

Relevant

The knowledge and skills we set out in our age-related expectations prepare children for the next stage of their education. Children become aware of the relevance of their science learning to careers which use science – even jobs and careers which don't obviously appear to use science, eg a florist, who needs an understanding of the parts of a flower, and a chef, who needs to understand the changes caused by mixing materials.

Inspiring

In Science, we introduce pupils to British and world-wide scientific achievements and challenges, past and present. We want to promote an appreciation and sense of awe and wonder when learning about the world around us and the impact Science has. Similarly, we want to develop a sense of awareness about the challenges that the world faces, such as climate change, and inspire some action to address this.

Creative

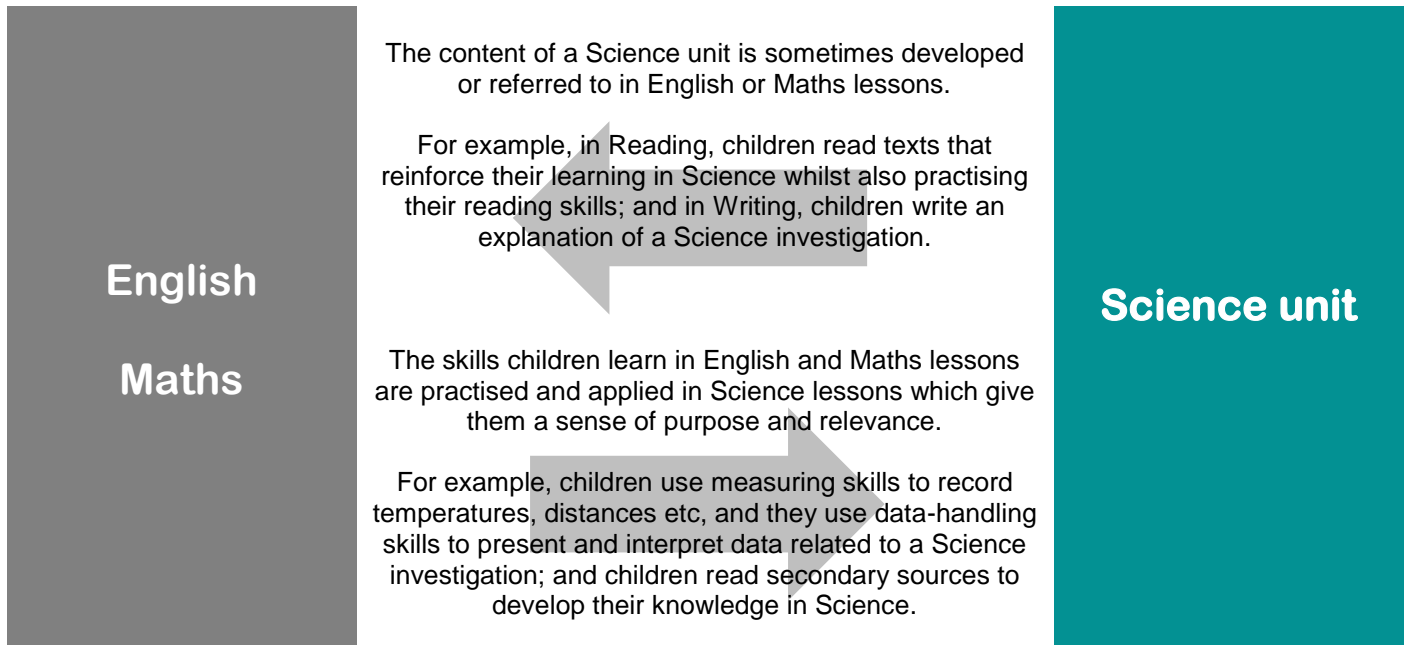
A characteristic of effective learning is creative and critical thinking – we want our children to develop this from the outset of their science learning journey: our children will explore different phenomena, ask questions and have freedom to answer these questions using the most appropriate enquiry type. Learning about scientists from the past and present demonstrates the power of creativity: having their own ideas, making links and working with ideas.

Overview (key points)

Cross-curricular links

To meet our curriculum aims, teachers deliver lessons which are coherently planned, and sequenced to ensure cumulatively sufficient **knowledge** and **skills** for future learning

Like English and Maths, Science is a **core subject** and is taught as a discrete subject. Science links closely to these subjects:



In addition, there are often links with many subjects. For example, Biology links to Geography (eg learning about the environment); and the collection and presentation of data links to Computing.

A two-year cycle

In Sphere Federation schools, teachers work in three different phases to plan and deliver the curriculum: Years 1 and 2, Years 3 and 4 and Years 5 and 6. There are various benefits of this, which include:

- 🌀 teachers can share ideas and skills
- 🌀 teachers can provide different areas of subject expertise
- 🌀 common learning in Science creates a talking point or 'buzz' for conversations
- 🌀 classes might swap teachers or combine to work with other children
- 🌀 there are economies of scale when organising visits out or visitors into school
- 🌀 to help reduce teachers' workload, a problem increasingly recognised by the Department for Education and Ofsted (eg School inspection handbook: Handbook for inspecting schools in England under section 5 of the Education Act 2005, November 2019)

As a result, we operate a two-year rolling programme for Science. This means that some children will encounter a Science unit when in Year 3, for example, and other children when in Year 4. The Science age-related expectations are the same for both year groups in the phase. Teachers differentiate to meet the needs of all pupils so that by the time they leave a phase, the vast majority have met the expectations. This means that the learning in a Year 3 child's book might look similar to that of a Year 4 child's book, but it may have been delivered and supported in a different way.

An advantage of a two-year cycle is that children learn some age-related expectations in one year and then secure their learning in the following year – an opportunity to reinforce, to provide for even greater 'mastery' of the learning; and an opportunity to go deeper with the learning, to use and apply their learning in more situations. This is especially true for skills in working scientifically.

Spiritual, moral, social and cultural development (SMSC)

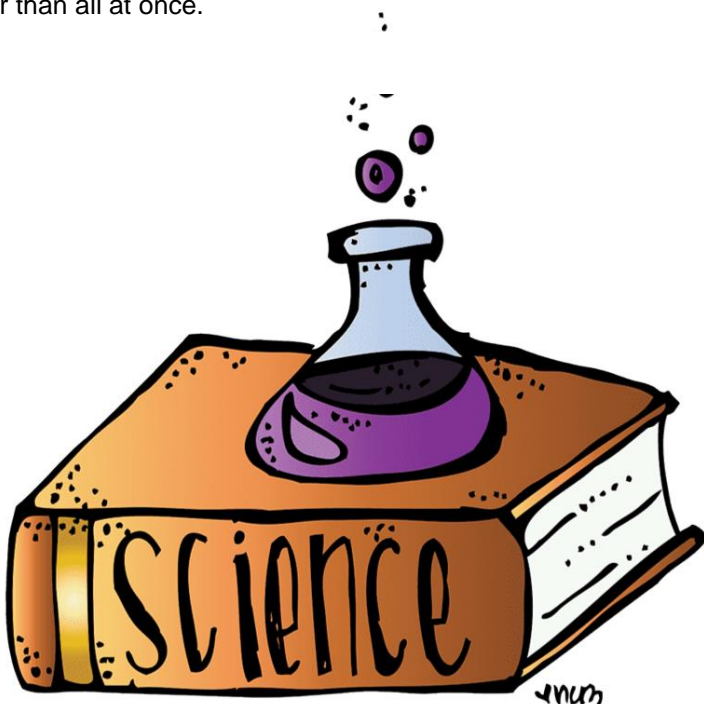
The National Curriculum states: 'Every state-funded school must offer a curriculum which is balanced and broadly based and which: promotes the spiritual, moral, cultural, mental and physical development of pupils at the school and of society' (2.1, p5). Science provides opportunities to promote SMSC, too:

- spiritual: developing a sense of awe and wonder at the complexity and pattern in natural phenomena
- moral: looking at good and bad uses of drugs; moral issues in the human food chain
- social: looking at ways in which the environment needs protection
- cultural: scientific development in relation to others – water supplies, new varieties of flowers and food crops

Science and Reading

When reading cross-curricular texts, teachers support children to read as a 'subject expert': in this case, reading as a scientist.

For the biggest impact, teachers focus on one or two of the points, rather than all at once.



Reading as a...

scientist

(closely matching our working scientifically skills)

- What scientific questions can you ask about this text?
- Does the text provide evidence to answer questions?
- Does the text provide evidence to support findings?
- Does the text back up or refute ideas or arguments?
- Can you visualise what this text is describing?
- Can you draw diagrams based on the text?
- Can you find and evaluate information in the text?
- What are the similarities, differences or changes explained in the text?
- What does the data show us?
- Can you explain this science?
- What conclusions can we draw from the text?
- Why has the author chosen to present this information in this way? (ie diagram, bold, text)

Switched on Science

Teachers use the Switched on Science schemes of learning as the basis of their planning whilst using their professional judgement to adapt these to meet the needs of their class. The schemes of learning include:

- **Teacher information:** learning objectives, cross-curricular links, background subject knowledge (including identification of misconceptions that pupils might hold in different areas of learning)
- **Working Scientifically:** lessons have hands-on practical enquiry at their core, as well as opportunities to research scientific ideas; the scheme equips children with the working scientifically skills they need as well as opportunities to engage with the five scientific enquiry types
- **Small Steps:** lessons are carefully sequenced ensuring coherent progression through a unit of learning; accompanying notes provide teachers with suggestions for challenging pupils as well as additional support for pupils who need it.

Working scientifically

Working scientifically skills are embedded within lessons. This allows children to revisit and secure these skills across a unit, year and phase. Typically, there is sufficient time within the Science curriculum for children to plan and develop their own investigations. For example, an enquiry in Y3/4 about the freezing points of different liquids may be developed by children into a subsequent activity which investigates if the freezing points change when the liquids are mixed together. There are also 'free' science units for teachers to plan science using a stimulus other than Switched on Science.

Featured scientists

Across the Key Stage 1 and 2 Science curriculum, there are 27 featured scientists. The scientists we've chosen represent diversity across a range of different scientific fields. Some are especially known – Alexander Graham Bell and Charles Darwin. Others are less well-known but just as inspiring – female scientists and scientists from a non-white background, contemporary scientists as well as celebrated pioneers from the past.

Revisiting prior learning

We teach Science as part of a spiral curriculum:

'A spiral curriculum is one in which there is an iterative revisiting of topics, subjects or themes throughout the course. A spiral curriculum is not simply the repetition of a topic taught. It requires also the deepening of it, with each successive encounter building on the previous one.'

'What is a spiral curriculum?', R M Harden, 2009

Teachers provide regular opportunities for children to revisit prior learning; this learning could be from the previous lesson, week, term or year. Sometimes, this will take the form of a short, focussed task at the beginning of a lesson. Occasionally, this may be a whole lesson to address any identified gaps in knowledge or skills.

Special educational needs and/or disabilities (SEND)

All three schools in Sphere Federation are inclusive and are committed to meeting the needs of children with SEND in **the most effective way** so that they achieve **the best possible outcomes**:

- we want pupils with SEND to acquire the knowledge and skills they need to reach their full potential,
- to be ready for the next stage in their education and,
- ultimately, to succeed in life.

To do this, we adapt how we implement the Science curriculum to meet the needs of pupils with SEND so that we can develop their knowledge, skills and abilities to apply what they know and can do with increasing fluency and independence. The adaptations we make are appropriate and reasonable, and are made in accordance with the Equality Act 2010 and the SEND code of practice.

Flexibility and freedom

In specific circumstances (such as where there is a significant event nationally/globally that merits consideration eg the Covid pandemic), teachers may choose to deviate a little from the topic. This is important as it provides opportunities for teachers to explore other aspects of learning within or beyond the curriculum – learning which is more spontaneous in that it meets children's questions, needs and interests in a responsive, more 'organic' way.

This corresponds to two of our Curriculum Aims (layer 3 of the pyramid shown on page 1):

- being **relevant**, so that we can respond to local, national and world events
- being **inspired**, so that we can celebrate scientific achievements

Topics: vocabulary

Within each Science unit, there are key subject-specific words/phrases that we want our children to know.

- At the start of the unit, there is a class assessment, where teachers introduce the key vocabulary and gauge the knowledge and understanding of the words as a whole class.
- Throughout the unit, these words are taught and used often. For example, children might review/revise/re-cap key vocabulary at the start of lessons (vocabulary might relate to previous as well as current units).
- At the end of the unit, children demonstrate their knowledge and understanding of the vocabulary. They may also use and apply the words in sentences or in a review of some sort.

Challenge and deeper learning

Across all subjects, teachers provide opportunities for challenge and deeper learning. Pupils benefit from this: whoever needs it, in whatever lesson. Sometimes, the challenge may not be evident in books; for example, challenge might be provided by less support during the teacher input; an additional, practical task that isn't recorded; and teacher questioning which is targeted to meet the needs of different pupils. Often, there is evidence in books of challenge for pupils: for example, teacher feedback which provides an additional task or thought-provoking question; an open-ended activity that promotes reasoning; and 'flipping over' the learning or activity by considering the opposite or reverse (eg by coming up with their own questions or criteria).

Impact: how we evaluate the impact of our Science curriculum

We measure pupil achievement – the acquisition of knowledge and skills – and progress using a number of strategies, including:

- on-going teacher assessments, based on questioning in class, observations and pupil outcomes (which includes their work in books), supported by moderation in school and across Sphere Federation
- at the end of each Science unit, pupils complete online assessments which provide teachers and senior leaders with information about impact and this informs next steps
- pupils' acquisition of vocabulary and knowledge through book scrutinies, learning conversations and learning walks
- at the end of the year, more formal assessment, with data submitted to senior leaders who track attainment and progress to measure impact.

Scrutiny of progress in books and learning conversations with children are key ways to assess impact. We explore how successful our children have been in acquiring knowledge and skills in relation to their stage of learning. In conversations with children, teachers and school leaders will ask questions relating directly to age-related expectations and to times when they might have needed more support or when they experienced greater challenge. Lesson visits and the monitoring of planning support our assessment of impact. Whole school areas for development are identified as a result of evaluating the impact of what we do.

We also evaluate impact by measuring pupil attitudes using a number of strategies, including feedback during learning conversations and in pupil and parent/carer surveys; attitudes and behaviour in lessons across the curriculum; and the quality of the work they produce, including taking pride in presentation. To support us in this, we refer back to Layer 3 of our curriculum intent: Attitudes. Children, particularly older children, will be encouraged to reflect on and self-assess their learning in terms of enjoyment, relevance, inspiration and creativity.



Long-term plans

The curriculum is delivered across a two-year cycle. In the table, the National Curriculum unit and associated year group is noted, but in a two-year programme, these sometimes appear in the other phase's year group. Small italic text refers to a corresponding Switched on Science resource title.




half-term	Year 1 and Year 2		Year 3 and Year 4		Year 5 and Year 6	
	Cycle A	Cycle B	Cycle A	Cycle B	Cycle A	Cycle B
Autumn 1	Chemistry Everyday Materials (Y2) <i>Materials Monster Squash, Bend, Twist and Stretch</i> <i>featured scientist: Charles Macintosh*</i>	Biology Living Things and Their Habitats (Y1)	Chemistry States of Matter (Y4) <i>Looking at States</i> <i>featured career: candle maker</i>	Biology Living Things and Their Habitats (Y4) <i>Living Things</i> <i>featured scientist: Jane Goodall*</i> <i>featured careers: conservationist, park ranger</i>	Chemistry Properties and Changes of Materials (Y5) <i>Material World</i> <i>featured careers: barista, chocolatier</i>	Biology Living Things and Their Habitats (Y6) <i>Classifying Living Things</i> <i>featured scientist: Carl Linnaeus, Sarah Fowler</i> <i>featured career: park ranger</i>
Autumn 2	Working scientifically <i>(eg current event, STEM project)</i>	Working scientifically <i>(eg current event, STEM project)</i>	Physics Light (Y3) <i>Light and Shadows</i> <i>featured career: director of photography</i>	Physics Sound (Y4) <i>What's That Sound?</i> <i>featured scientist: Alexander Graham Bell</i> <i>featured career: sound proof glass manufacturer</i>	Physics Light (Y6) <i>Light</i> <i>featured scientist: Alhazen</i> <i>featured career: laser designer</i>	Physics Forces (Y5) <i>Let's Get Moving</i> <i>featured scientist: Isaac Newton, Galileo Galilei*</i> <i>featured career: engineer</i>
Spring 1	Physics Seasonal Changes (Y2) <i>featured scientist: George James Symons</i>	Chemistry Everyday Materials (Y1) <i>Celebrations</i> <i>featured scientist: John Dunlop*, Patsy Sherman</i>	Physics Electricity (Y4) <i>Power It Up!</i> <i>featured scientist: Maria Telkes</i> <i>featured career: electrician</i>	Chemistry Rocks (Y3) <i>Rocks, soils and fossils!</i> <i>featured scientist: Mary Anning*</i> <i>featured career: quality controller</i>	Biology Evolution and Inheritance (Y6) <i>Evolution and Inheritance</i> <i>featured scientist: Charles Darwin*</i>	Physics Earth and Space (Y5) <i>Out of this World</i> <i>featured scientist: Helen Sharman, Maggie Aderin-Pocock</i> <i>featured career: planetarium manager</i>
Spring 2	Working scientifically <i>(eg current event, SoS Holiday or STEM project)</i>	Working scientifically <i>(eg current event, SoS Little Masterchefs or STEM project)</i>	Working scientifically <i>(eg current event, SoS The Nappy Challenge or STEM project)</i>	Working scientifically <i>(eg current event, SoS The Big Build or STEM project)</i>	Working scientifically <i>(eg current event, SoS Amazing Changes or STEM project)</i>	Working scientifically <i>(eg current event, SoS The Titanics or STEM project)</i>
Summer 1	Biology Plants (Y1) <i>featured scientist: Jeane Baret</i>	Biology Plants (Y2) <i>Young Gardeners</i>	Biology Plants (Y3) <i>How Does Your Garden Grow?</i> <i>featured scientist: Sir Joseph Banks, Tom Hart-Dyke</i> <i>featured career: gardener</i>	Physics Forces and Magnets (Y3) <i>Forces and Magnets</i> <i>featured careers: radiographer, train driver</i>	Physics Electricity (Y6) <i>Electricity!</i> <i>featured scientist: Thomas Edison, Nikola Tesla</i> <i>featured career: robot programmer</i>	Biology Living Things and Their Habitats (Y5) <i>Circle of Life</i> <i>featured scientist: Sir David Attenborough</i> <i>featured career: florist</i>
Summer 2	Biology Animals including Humans (Y1) <i>Who Am I?</i> <i>featured scientist: George Mottershead</i>	Biology Animals including Humans (Y2) <i>Healthy me</i> <i>featured scientist: Florence Nightingale</i>	Biology Animals including Humans (Y3) <i>Food and our Bodies</i> <i>featured scientist: Marie Curie</i> <i>featured career: physiotherapist</i>	Biology Animals including Humans (Y4) <i>Teeth and Eating</i> <i>featured scientist: Washington Sheffield</i> <i>featured careers: dentist, fly fisherman</i>	Biology Animals including Humans (Y6) <i>Healthy Bodies</i> <i>featured scientist: Marie Maynard-Daly</i> <i>featured careers: cardiologist, performance nutritionist</i>	Biology (RSE) Animals including Humans (Y5) <i>Growing up and growing old</i>


Age-related expectations: Science Working scientifically

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Skills</p> <ul style="list-style-type: none"> • I can ask simple questions and recognise that they can be answered in different ways. • I can observe carefully, using simple equipment. • I can perform simple tests. • I can identify and classify. • I can use my observations and ideas to suggest answers to questions. • I can gather and record data to help in answering questions. 	<p>Skills</p> <ul style="list-style-type: none"> • I can ask relevant questions and use different types of scientific enquiries to answer them. • I can set up simple practical enquiries, comparative and fair tests. • I can make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers. • I can gather, record, classify and present data in a variety of ways to help answer questions. • I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables. • I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. • I can use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions. • I can identify differences, similarities or changes related to simple scientific ideas and processes. • I can use straightforward scientific evidence to answer questions or to support their findings. 	<p>Skills</p> <ul style="list-style-type: none"> • I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. • I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate. • I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. • I can use test results to make predictions to set up further comparative and fair tests. • I can report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written form such as displays and other presentations. • I can identify scientific evidence that has been used to support or refute ideas or arguments. <div data-bbox="1608 794 1975 1423" data-label="Image"> </div>

Age-related vocabulary: Science Working scientifically

Years 1 and 2	Years 3 and 4	Years 5 and 6
<p>Cycle A and B</p> <ul style="list-style-type: none"> • to investigate: to explore something carefully • to sort: to arrange things into groups • to identify: to spot something • to observe: to notice something • to compare: to find similarities and/or differences • to predict: to say that something will happen in the future • data: a collection of information • pattern: something that happens in a repeated and regular way • equipment: the things needed for an investigation  <p>A cartoon illustration of a young boy with spiky blonde hair, wearing round glasses, a white lab coat over a blue shirt and red tie, and brown trousers. He is holding a test tube with red liquid and bubbles rising from it. He has a friendly expression and is gesturing with his other hand.</p>	<p>Cycle A and B</p> <ul style="list-style-type: none"> • scientific enquiry: finding things out in a scientific way (comparative and fair tests; noticing patterns; observing changes over time; grouping and classifying things; using secondary sources to find things out) • to record findings: to document the data you have found (eg drawings, labelled diagrams, keys, charts, tables) • to communicate results: to explain what you have found from the data you have recorded • to conclude: to reach a final decision or judgement based on results • to classify: to arrange things in categories based on their characteristics • comparative and fair test: tests which look at the relationship between different variables • relationship: the way in which things are connected • variable: something that can be changed in an experiment • accurate: correct information • systematic: doing something in an ordered, methodical way • secondary sources: somebody else's research which may be necessary when a practical investigation is not possible • practical: actually doing something 	<p>Cycle A and B</p> <ul style="list-style-type: none"> • scientific enquiry finding things out in a scientific way (comparative and fair tests; noticing patterns; observing changes over time; grouping and classifying things; using secondary sources to find things out) • evidence: facts or information which indicate if something is true or valid • to justify: to show or prove something • control variable: a variable which needs to be kept the same during an experiment • independent variable: the variable that is being changed during an experiment • dependent variable: the variable being tested or measured during an experiment • repeat readings: repeating an experiment to ensure that the data gathered is reliable and not a fluke • causal relationships: a cause and effect relationship eg the tighter the string, the higher the pitch • degree of trust: the level of confidence in the results of an investigation • further test: these may be needed if a conclusion cannot be drawn from the results or a new question arises from your results which could be tested • to refute: to prove something to be wrong

Age-related expectations: Science Biology

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Knowledge and skills</p> <p>Animals including humans cycle A T3.2 (Y1)</p> <ul style="list-style-type: none"> I can identify and name a variety of common animals, including fish, amphibians, reptiles, birds and mammals. I can identify and name a variety of common animals that are carnivores, herbivores and omnivores. I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). I can identify, name, draw and label the basic parts of the human body and say which part of the human body is associated with each sense. <p>Animals including humans cycle B T3.2 (Y2)</p> <ul style="list-style-type: none"> I know that animals, including humans, have offspring, which grow into adults. I can find out about and describe the basic needs of animals, including humans, for survival (water, food and air). I can describe the importance for humans of exercise, eating the right amount of different types of food, and hygiene. <p>Plants cycle A T3.1 (Y1)</p> <ul style="list-style-type: none"> I can identify and name a variety of common, wild and garden plants. I can identify and name various deciduous and evergreen trees. I can identify and describe the basic structure of a variety of common flowering plants, including trees. <p>Plants cycle B T3.1 (Y2)</p> <ul style="list-style-type: none"> I can observe and describe how seeds and bulbs grow into mature plants. I can find out and describe how plants need water, light and suitable temperature to grow and be healthy. <p>Living things and their habitats cycle B T1.1 (Y2)</p> <ul style="list-style-type: none"> I can explore and compare differences between things that are living, dead and things that have never been alive. I know that most living things live in habitats to which they are suited; I can describe how different habitats provide for the basic needs of different kinds of animals and plants; and how they depend on each other. I can identify and name a variety of plants and animals in their habitats, including micro-habitats. I can 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. 	<p>Knowledge and skills</p> <p>Animals including humans cycle A T3.2 (Y3)</p> <ul style="list-style-type: none"> I can identify animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get nutrition from what they eat. I can identify that humans and some other animals have skeletons and muscles for support, protection and movement. <p>Animals including humans cycle B T3.2 (Y4)</p> <ul style="list-style-type: none"> I can describe the simple functions of the basic parts of the digestive system in humans. I can identify the different types of teeth in humans and their simple functions. I can construct and interpret a variety of food chains, identifying producers, predators and prey. <p>Plants cycle A T3.1 (Y3)</p> <ul style="list-style-type: none"> I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. I can 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. I can investigate the way in which water is transported within plants. I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal <p>Living things and their habitats cycle B T1.1 (Y4)</p> <ul style="list-style-type: none"> I know that living things can be grouped in a variety of ways. I can explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. I know that environments can change and that this can sometimes pose dangers to living things. 	<p>Knowledge and skills</p> <p>Animals including humans cycle A and B T3.2 (Y5)</p> <ul style="list-style-type: none"> I can describe the changes as humans develop to old age. <p>Animals including humans cycle A and B T3.2 (Y6)</p> <ul style="list-style-type: none"> I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. I am aware of the impact of diet, exercise, drugs and lifestyle on the way my body functions. I can describe the ways in which nutrients and water are transported within animals, including humans. <p>Living things and their habitats cycle B T3.1 (Y5)</p> <ul style="list-style-type: none"> I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird. I can describe the life processes of reproduction in some plants and animals. <p>Living things and their habitats cycle B T1.1 (Y6)</p> <ul style="list-style-type: none"> I can 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. I can give reasons for classifying plants and animals based on specific characteristics. <p>Evolution and inheritance cycle A T2.1 (Y6)</p> <ul style="list-style-type: none"> I know that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. I know that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Age-related vocabulary: Biology

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Vocabulary</p> <p>Animals including humans cycle A T3.2 (Y1)</p> <ul style="list-style-type: none"> fish: live and breathe in water amphibian: live both in and out of water reptile: covered with scales; lay soft-shelled eggs bird: has feathers; wings; lay eggs mammal: has a backbone; breathes air; grows hair or fur carnivore: eats only animals herbivore: eats only plants omnivore: eats both plants and animals <p>Animals including humans cycle B T3.2 (Y2)</p> <ul style="list-style-type: none"> life-cycle: the journey of a living thing from its birth to its death basic needs: the things that an animal needs to live exercise: moving parts of the body to become stronger and healthier balanced diet: a variety of different types of food that will keep you healthy hygiene: the things we do to keep our body clean and help stop the spread of germs healthy: feeling well and happy <p>Plants cycle A T3.1 (Y1)</p> <ul style="list-style-type: none"> plant: a living thing that has roots in the ground or water flower: the part of a plant where seeds are made tree: tall, woody plants that have a stem called a trunk deciduous: a plant that drops its leaves every year evergreen: a plant that keeps its leaves all year round petal: the often colourful parts of the flower that attract insects leaf: a flat part of a plant attached to the stem stem: the stalk of a plant roots: sit under the soil; they take water and nutrients to the plant <p>Plants cycle B T3.1 (Y2)</p> <ul style="list-style-type: none"> seeds: the part of a plant which can grow into a new plant bulbs: the round underground part of a plant that contains food for the plant (eg onion bulb, daffodil bulb, tulip bulb) basic needs: the things that a plant needs to live temperature: a measurement of hotness or coldness growth: an increase in size healthy: feeling well and happy germinate: when a seed begins to grow into a plant seedling: a young plant grown from a seed 	<p>Vocabulary</p> <p>Animals including humans cycle A T3.2 (Y3)</p> <ul style="list-style-type: none"> balanced diet: a diet that has the right amount of nutrients nutrients: useful substances found in food skeleton: supports and protects the body, allowing movement exoskeleton: a skeleton that some animals have that is outside their bodies like a suit of armour muscles: important tissue in the body of animals and humans that enables movement joints: where bones meet; there are different types of joint that can move in different ways to make your body move (eg ball and socket, hinge, sliding joints, fixed joints) to contract: when a muscle gets shorter and pulls to relax: when a muscle stops contracting <p>Animals including humans cycle B T3.2 (Y4)</p> <ul style="list-style-type: none"> energy: animals and humans get this from the food they eat; it is used to help us move, grow and repair our body digestion: the process of breaking down food in our bodies oesophagus: the food pipe stomach: a bag of muscle used in the first part of digestion small intestine: the thin tube where broken down food is absorbed large intestine: absorbs water and stores undigested food incisor: a tooth for biting food found at the front of the mouth canine: a tooth for tearing food; they are the pointed teeth next to the incisors molar: a tooth for grinding food found at the back of the mouth <p>Plants cycle A T3.1 (Y3)</p> <ul style="list-style-type: none"> stem: holds the plant upright and supports the leaves; contains tubes that allow water to travel from the roots to the rest of the plant root: helps anchor the plant into the soil; takes up water and nutrients from the soil leaves: catch sunlight and use this to make food photosynthesis: how plants turn sunlight into food pollen: a dust-like powder that causes plants to make new seeds pollination: transferring pollen from the male parts of a flower to the female part of a flower so new plants can be made stamen: the male part of the flower which produces pollen stigma: the female part of a flower that pollen attaches to during pollination seed dispersal: the way seeds get from the parent plant to a new place so that they can grow into new plants 	<p>Vocabulary</p> <p>Animals including humans cycle A and B T3.2 (Y5)</p> <ul style="list-style-type: none"> adolescence: the time in a young person's life when physical and emotional changes leading to adulthood are happening adolescent: a young person in the process of developing from a child into an adult (teenager) teenager: a person aged between 13 and 19 years old adult: a person who is fully grown puberty: the first part of adolescence; when physical changes begin to happen to the body menstruation: a monthly cycle in women; each month an egg is released and if it is not fertilized by a sperm, the female has her period pregnant: the condition of a female animal when there is a baby growing inside her womb gestation period: the amount of time that a baby spends inside its mother's womb before it is born life expectancy: how many years an animal is expected to live <p>Animals including humans cycle A and B T3.2 (Y6)</p> <ul style="list-style-type: none"> circulatory system: system of organs and tissues which circulate blood around the body heart: the organ that pumps blood around the body lungs: the organ that gathers in air as part of breathing blood: the liquid that transports oxygen around the body blood vessels: a series of tubes inside your body that move blood to and from your heart oxygen: the gas in the air that is needed by our bodies carbon dioxide: a gas released when humans and other living things breathe or when materials are burned exercise: the activity of exerting your muscles in various ways to keep fit and healthy addiction: an uncontrollable urge to do something as it makes you feel good <p>Living things and their habitats cycle B T3.1 (Y5)</p> <ul style="list-style-type: none"> reproduction: the process by which organisms create new versions of themselves (offspring); all living things reproduce fertilization: when an egg and pollen (or sperm) join together gestation: when a baby animal develops inside its mother's womb pollination: transferring pollen from the male parts of a flower to the female part of a flower so new plants can be made germination: the process by which seeds grow into plants metamorphosis: a dramatic change in the life cycle of an animal in which it ends up looking totally different sperm: male reproductive cells

Living things and their habitats cycle B T1.1 (Y2)

- **alive:** a living thing; not dead
- **dead:** no longer alive
- **habitat:** the place where an animal or plant lives
- **basic needs:** the things that a plant or animal need to live
- **food chain:** shows who eats who in a habitat
- **predator:** an animal that hunts and eats other animals
- **prey:** an animal that is eaten by another animal

Living things and their habitats cycle B T1.1 (Y4)

- **vertebrate:** an animal with a backbone
- **invertebrate:** an animal without a backbone
- **warm-blooded:** animals that can control their body temperature (birds and mammals)
- **cold-blooded:** animals that cannot control their body temperature; their body temperature changes with the air or water temperature (all animals except birds and mammals)
- **organism:** a living thing; animal or plant
- **insect:** an invertebrate with six legs
- **classification key:** a set of questions about the characteristics of organisms; used to identify a living thing or decide which group a living thing belongs to
- **environmental danger:** something that can threaten a habitat



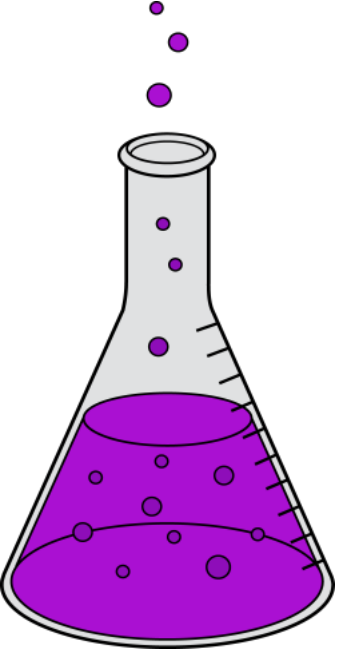
Living things and their habitats cycle B T1.1 (Y6)

- **taxonomy:** the science of naming, describing and classifying organisms
- **organism:** a living thing; animal or plant
- **kingdom:** the highest division in the classification system; there are five kingdoms (animals, plants, fungi, protists, monera)
- **flora:** living things that are plants
- **fauna:** living things that are animals
- **bacteria:** single-celled organisms; most of which can only be seen with a microscope
- **fungi:** organisms that feed on the remains of other living things; can be single-celled or multi-celled (eg mushroom, yeast, mould)
- **micro-organism:** an organism that can only be seen through a microscope

Evolution and inheritance cycle A T2.1 (Y6)

- **evolution:** change in living things over time
- **inherited:** the way that a trait or characteristic is passed to offspring from parents
- **trait:** a quality or characteristic belonging to something
- **adaptation:** a small change that a living thing goes through
- **natural selection:** a process in which living things adapt themselves in order to survive, that they don't have any control over
- **prehistoric:** the time classed as 'before history' as it was so long ago it hasn't been recorded or written
- **variety:** differences between things as part of a whole group
- **fossil:** the prehistoric remains of a plant or animal


Age-related expectations: Science Chemistry

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Knowledge and skills</p> <p>Everyday Materials cycle B T2.1 (Y1)</p> <ul style="list-style-type: none"> I can distinguish between an object and the materials from which it is made. I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock. I can describe the simple physical properties of a variety of everyday materials. I can compare and group together a variety of everyday materials on the basis of their simple physical properties. <p>Everyday Materials cycle A T1.1 (Y2)</p> <ul style="list-style-type: none"> I can identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses. I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. 	<p>Knowledge and skills</p> <p>States of matter cycle A T1.1 (Y4)</p> <ul style="list-style-type: none"> I can compare and group materials together, according to whether they are solids, liquids or gases. I can 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). I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. <p>Rocks cycle B T2.1 (Y3)</p> <ul style="list-style-type: none"> I can compare and group different rocks on the basis of their appearance and simple physical properties. I can describe in simple terms how fossils are formed when things that have lived are trapped within rock. I can recognise that soils are made from rocks and organic matter. 	<p>Knowledge and skills</p> <p>Properties and changes of materials cycle A T1.1 (Y5)</p> <ul style="list-style-type: none"> I can 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. I know that some materials will dissolve in liquid to form a solution. I can describe how to recover a substance from a solution. I can use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. I can demonstrate that dissolving, mixing and changes of state are reversible changes. I can 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.


Age-related vocabulary: Chemistry

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Vocabulary</p> <p>Everyday materials cycle A T1.1 (Y2)</p> <ul style="list-style-type: none"> • to identify: to figure out what something is • material: the substance used to make something else • suitable: being right or fit for use • to compare: to find differences and similarities between things • purpose: the reason why something exists • solid: a substance that keeps its size and shape <p>Everyday materials cycle B T2.1 (Y1)</p> <ul style="list-style-type: none"> • material: the substance used to make something else • hard: solid, firm and not easy to break • soft: easy to bend or shape • stretchy: a material that can be made longer or wider without tearing • stiff: not easily bent or changed in shape • shiny: a surface that is very clean or polished • dull: not bright or shiny • smooth: a flat surface • rough: bumpy, not smooth 	<p>Vocabulary</p> <p>States of matter cycle A T1.1 (Y4)</p> <ul style="list-style-type: none"> • matter: another name for 'material' • solid: a state of a material when it cannot change shape, but holds the shape of whatever container it was frozen in • liquid: a state of a material when it can flow from one place to another, and can be poured • gas: a state of a material when it fills the entire space available • boiling point: the temperature at which a liquid turns into a gas • freezing point: the same temperature as a material's melting point. This is the temperature at which a liquid turns into a solid • melting point: the temperature at which a solid melts • condensing: the process when a gas turns into a liquid • evaporation: when a liquid turns into a gas, below its boiling point <p>Rocks cycle B T2.1 (Y3)</p> <ul style="list-style-type: none"> • rock: a hard material made from one or more minerals • mineral: a natural substance that makes up rock • permeable: allows water to pass through • impermeable: does not allow water to pass through • fossil: the prehistoric remains of a plant or animal • soil: small particles of rock mixed with decayed plant and animal material • humus: the part of soil made from dead plants and animals • palaeontologist: scientists who study the remains of plants and animals that lived millions of years ago • extinct: when there are no more of a particular animal or plant alive anywhere in the world 	<p>Vocabulary</p> <p>Properties and changes of materials cycle A T1.1 (Y5)</p> <ul style="list-style-type: none"> • to dissolve: when a solid mixes with liquid to make a solution • soluble: when something can dissolve • insoluble: when something can't dissolve • mixture: two or more substances that can be separated • solvent: usually (liquid) that does the dissolving • solution: mixture of solid and liquid (you might not be able to see the solid) • chemical reaction: a process in which one or more substances are converted to one or more different substances • reversible: a change that can be undone or reversed • irreversible: a change that can't be undone or reversed <div data-bbox="1659 719 2002 1374" style="text-align: center;"> </div>

Age-related expectations: Science Physics

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Knowledge and skills</p> <p>Seasonal Changes cycle A T2.1 (Y2)</p> <ul style="list-style-type: none"> I can observe changes across the four seasons. I can observe and describe weather associated with the seasons and how day length varies. 	<p>Knowledge and skills</p> <p>Light cycle A T1.2 (Y3)</p> <ul style="list-style-type: none"> I know that I need light in order to see things and that dark is the absence of light. I know that light is reflected from surfaces. I know that light from the sun can be dangerous and that there are ways to protect my eyes. I know that shadows are formed when the light from a light source is blocked by an opaque object. I can find patterns in the way that the size of shadows change. <p>Electricity cycle A T2.1 (Y4)</p> <ul style="list-style-type: none"> I can identify common appliances that run on electricity. I can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. I can 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. I can recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. I can recognise some common conductors and insulators, and associate metals with being good conductors. <p>Sound cycle B T1.2 (Y4)</p> <ul style="list-style-type: none"> I can identify how sounds are made, associating some of them with something vibrating. I know that vibrations from sounds travel through a medium to the ear. I can find patterns between the pitch of a sound and features of the object that produced it. I can find patterns between the volume of a sound and the strength of the vibrations that produced it. I know that sounds get fainter as the distance from the sound source increases. <p>Forces and magnets cycle B T3.1 (Y3)</p> <ul style="list-style-type: none"> I can compare how things move on different surfaces. I can notice that some forces need contact between two objects, but magnetic forces can act at a distance. I can observe how magnets attract or repel each other and attract some materials and not others. I can 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. I can describe magnets as having two poles. I can predict whether two magnets will attract or repel each other, depending on which poles are facing. 	<p>Knowledge and skills</p> <p>Light cycle A T1.2 (Y6)</p> <ul style="list-style-type: none"> I am aware that light appears to travel in straight lines. I can 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. I can 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. I can use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. <p>Electricity cycle A T3.1 (Y6)</p> <ul style="list-style-type: none"> I can associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. I can 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. I can use recognised symbols when representing a simple circuit in a diagram. <p>Forces cycle B T1.2 (Y5)</p> <ul style="list-style-type: none"> I can explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. I can identify the effects of air resistance, water resistance and friction that act between moving surfaces. I know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. <p>Earth and space cycle B T2.1 (Y5)</p> <ul style="list-style-type: none"> I can describe the movement of the Earth, and other planets, relative to the Sun in the solar system. I can describe the movement of the Moon relative to the Earth. I can describe the Sun, Earth and Moon as approximately spherical bodies. I can use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Age-related vocabulary: Science Physics

Years 1 and 2 (expectations for the end of Year 2)	Years 3 and 4 (expectations for the end of Year 4)	Years 5 and 6 (expectations for the end of Year 6)
<p>Knowledge and skills</p> <p>Seasonal Changes cycle A T2.1 (Y1)</p> <ul style="list-style-type: none"> season: there are four seasons which have different weather that affects plants and animals spring: this is the season when plants start to grow and bloom summer: this is the season when the weather is sunnier and warmer; the amount of time it is light during the day is at its longest autumn: this is the season when it starts to get cooler and leaves change colour and fall from deciduous trees winter: this is the coldest season; the amount of time it is light is at its shortest weather: how hot or cold, wet or dry, calm or stormy it is day: when you can see the sun and its light night: when you can't see the sun and its light 	<p>Knowledge and skills</p> <p>Light cycle A T1.2 (Y3)</p> <ul style="list-style-type: none"> light source: the place where light originates from transparent: lets most or all light through translucent: lets some light through opaque: does not let light pass through shadow: darkness caused by light being blocked to reflect: to change the direction of light using a shiny surface surface: the top or uppermost layer of something darkness: the absence of light mirror: a shiny, polished, reflective surface <p>Electricity cycle A T2.1 (Y4)</p> <ul style="list-style-type: none"> electricity: a type of energy used to power appliances appliance: a piece of equipment used to perform a specific task components: the items that make up a circuit battery: a portable electricity supply cell: the scientific name for a battery circuit: the path followed by an electrical current wire: used to connect components together insulator: a material through which electricity cannot flow conductor: a material through which electricity can flow <p>Sound cycle B T1.2 (Y4)</p> <ul style="list-style-type: none"> sound source: something that makes a sound vibration: when something moves up or down, backwards and forwards or side to side quickly volume: how loud a sound is pitch: how high or low a sound is medium: a substance through which sound waves can travel decibels: a unit of measurement used to measure how loud or faint a sound is insulator: a substance that absorbs sound so that it can't travel conductor: a substance that allows sound to travel through it <p>Forces and magnets cycle B T3.1 (Y3)</p> <ul style="list-style-type: none"> force: a push, pull, twist or turn caused when two objects interact with each other contact: touching non-contact: not touching magnet: an object or device that attracts iron or another magnetic material magnetic: attracted to a magnet to attract: to pull towards to repel: to push away pole: area of a magnet where the magnetic force is strongest compass: a device that aids navigation by pointing to Earth's North and South poles 	<p>Knowledge and skills</p> <p>Light cycle A T1.2 (Y6)</p> <ul style="list-style-type: none"> pupil: the black hole in the centre of the eye that lets light in line chart: a graph with points connected by lines to show how something changes in value as time goes by or as something else changes to cast: to cause light or shadow to appear on a surface reflection: light bouncing off the surface of an object light ray: the path that light takes periscope: a vertical tube containing a set of mirrors that gives you a view of what is above you when you look through the bottom of the tube <p>Electricity cycle A T3.1 (Y6)</p> <ul style="list-style-type: none"> current: the movement of electricity through a circuit fuse: a safety device that will melt and make a break in a circuit if there is too much electricity mains: the electricity that comes from a socket terminals: the ends of a battery; one is positive and one is negative <p>Forces cycle B T1.2 (Y5)</p> <ul style="list-style-type: none"> gravity: the force that attracts something towards the Earth's centre friction: the force made when two objects rub together air resistance: the resistance of air to forward movement water resistance: the resistance of water to forward movement non-contact force: a force that does not need to touch an object to work (eg magnetic force) force meter: a piece of equipment for measuring forces Newton: the unit of force mechanism: a group of moving parts that work together lever: a simple mechanism used to help lift objects <p>Earth and space cycle B T2.1 (Y5)</p> <ul style="list-style-type: none"> day-time: the time when part of the Earth is in daylight night-time: the time when part of the Earth is in darkness geocentric: the Earth is at the centre of the Solar System (Earth-centred) heliocentric: the Sun is at the centre of the Solar System (Sun-centred) orbit: the path of a planet or moon around another celestial object planet: is round; orbits a star; has cleared smaller objects away from its orbit solar system: a series of planets that orbit a star star: an astronomical body that produces its own energy time zone: a geographical region where the same time is set