

## Our curriculum guide: Science

**Date:** September 2023 and reviewed on an on-going basis

### Introduction

This Curriculum Guide relates to Science, a core subject in the National Curriculum (Department for Education, 2014). It sits alongside similar documents for Early Years, Reading, Writing, Maths, Topics and others.

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 slightly differently: 'happy and healthy place to achieve and believe'.)*

The knowledge and skills we are required to teach are set out in the National Curriculum. We set these out in a year-group based sequence of learning (age-related expectations). Alongside these statutory curriculum requirements, there is additional or explicit learning, too.



### Curriculum structure

The programmes of study set out in the National Curriculum can be grouped into the three main areas of science: biology, chemistry and physics. In the table below, the number in brackets indicates the number of times the unit appears across Key Stage 1 and 2 in the National Curriculum, although it's important to note the large overlap in many of the units, such as the four chemistry units.

Pupils are also taught about working scientifically – using practical scientific methods, processes and skills – through the teaching of the programmes of study.

biology	chemistry	physics
<ul style="list-style-type: none"> <li>• animals, including humans (6)</li> <li>• living things and their habitats (4)</li> <li>• plants (3)</li> <li>• evolution and inheritance (1)</li> </ul>	<ul style="list-style-type: none"> <li>• materials (3)</li> <li>• states of matter (1)</li> <li>• rocks (1)</li> </ul>	<ul style="list-style-type: none"> <li>• seasonal changes (1)</li> <li>• light (2)</li> <li>• forces and magnets (2)</li> <li>• sound (1)</li> <li>• electricity (2)</li> <li>• earth and space (1)</li> </ul>
working scientifically		
<p>Working scientifically skills ensure children learn about the discipline of Science as well as the substantive knowledge set out in the National Curriculum.</p> <p>The skills are embedded within lessons. This allows children to revisit and secure these skills across a Science unit and across the years. Typically, there is sufficient time within the Science curriculum for children to plan and develop their own investigations. For example, an enquiry in Year 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 liquids are mixed together.</p> <p>Each science unit features scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions. The five types of scientific enquiry are:</p> <ul style="list-style-type: none"> <li>• observing over time</li> <li>• pattern seeking</li> <li>• identifying, classifying and grouping</li> <li>• comparative and fair testing (controlled investigations)</li> <li>• research using secondary sources</li> </ul>		

## Key elements

The following are some of the key elements of our Science curriculum.

### Cross-curricular links

Our Science curriculum goes beyond the statutory content set out in the National Curriculum – see our age-related expectations (below). Like English and Maths, Science is a **core subject** and is taught as a discrete subject. However, there are close links with other subjects. When reading cross-curricular texts, teachers support children to read as a 'subject expert': in this case, reading as a scientist. 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.

### 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; for example:

- 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

### Vocabulary

Within each Science unit of learning, there are key words and phrases that we want our children to know. These are subject-specific but might relate to previous as well as current units.

- 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. Children might review/revise/re-cap key vocabulary at the start of lessons, too.
- At the end of the unit, children demonstrate their knowledge and understanding of the vocabulary. They may also use and apply the words in a review of some sort.

### Resources

Teachers use the White Rose 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 guidance:** National Curriculum links, key questions, vocabulary, potential misconceptions, enquiry questions (when relevant), cross-curricular links, background subject knowledge
- **Small steps:** lessons are carefully sequenced ensuring coherent progression through a unit of learning; accompanying notes provide teachers with practical ideas and key knowledge
- **Working scientifically:** each step has a working scientifically skill focus which develops across year groups and has 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

### Scientists and careers

Across the Key Stage 1 and 2 Science curriculum, we've planned for children to learn about different scientists. The scientists we've chosen represent diversity across a range of different scientific fields. Some are especially known, such as 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.

We've also make links between Science and related careers. The aim is to show children that people use science in a wide range of careers. For example, a talk from a structural engineer highlights how she uses KS2 forces knowledge in her career. Another talk from a sound engineer takes pupils on a tour of a theatre and how he needs to make sure that the audience can hear what's happening on stage. In all of these talks, children have the opportunity to ask the person questions about their career and education. We constantly look for these opportunities with STEM Ambassadors.



## 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 through retrieval practice at the beginning of each lesson; this learning could be from the previous lesson, week, term or year. The science units are carefully planned to allow children to build on and revisit previously taught learning. For example, in one particular year, children learn about skeletons in the Autumn term and fossils in Spring, with one helping to inform the other.

## Adaptive teaching

Adaptive teaching is about being responsive: adjusting teaching to better match pupil need. The extent of adaptation varies depending on individual contexts. Adaptations might include:

- targeted/tailored support
- additional practice
- breaking down content into smaller components
- teaching carefully selected groups
- well-chosen books and other resources

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.

Similarly, teachers provide opportunities for challenge and deeper learning. Challenge may be seen in pupils' exercise books: for example, teacher feedback which provides an additional task or thought-provoking question, or an open-ended activity that promotes reasoning. However, often 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.

Occasionally, teachers may also adapt teaching by deviating from the Science unit if it ensures learning is responsive and relevant. An example would be responding to significant local, national and world events, such as the Covid epidemic or a significant event in space. This flexibility is important as it provides opportunities for teachers to explore other aspects of learning within or beyond the Science curriculum – learning which is more spontaneous in that it meets children's questions, needs and interests in a responsive, more 'organic' way.



## Monitoring and evaluating

We continually review the Science curriculum, evaluating its impact on children's learning over time.

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 half-term, pupils complete online assessments which provide teachers and senior leaders with information about impact and this informs next steps
- the 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 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/carers surveys; attitudes and behaviour in lessons across the curriculum; and the quality of the work they produce, including taking pride in presentation.



# Long-term plans

We follow the White Rose Science schemes of learning. Teachers use professional judgement to adapt these to meet the needs of their class. The Science curriculum is split into units which are written for content rather than time. This ensures that children are developing a solid understanding of scientific processes and concepts.

## Year 1

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<b>Autumn term</b>	Biology The human body FREE TRIAL					Biology Seasonal changes	Chemistry Materials				Biology Seasonal changes	
<b>Spring term</b>	Biology Planning A	Biology Animals					Sustainability	Caring for the planet		Biology Seasonal changes	Biology Planning B	Consolidation
<b>Summer term</b>	Biology Plants					Biology Planning C	Sustainability Growing and cooking		Biology Seasonal changes			Consolidation

## Year 2

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	
Autumn term	Biology Animals' needs for survival FREE TRIAL  VIEW				Biology Humans  VIEW		Chemistry Materials  VIEW				Sustainability Plastic VIEW		
Spring term	Biology Plants (light and dark)  VIEW		Biology Living things and their habitats  VIEW								Biology Light and dark VIEW		Consolidation
Summer term	Biology Plants (buds and seeds)  VIEW		Biology Growing up  VIEW				Biology Buds and seeds  VIEW		Biology Growing up  VIEW		Sustainability Wildlife VIEW		Consolidation

## Year 3

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Biology Skeletons FREE TRIAL  <a href="#">VIEW</a>			Biology Movement  <a href="#">VIEW</a>	Biology Nutrition and diet  <a href="#">VIEW</a>			Sustainability Food waste  <a href="#">VIEW</a>	Chemistry Rocks  <a href="#">VIEW</a>			Consolidation
Spring term	Chemistry Fossils  <a href="#">VIEW</a>		Chemistry Soils  <a href="#">VIEW</a>			Physics Light  <a href="#">VIEW</a>						Consolidation
Summer term	Biology Plants A  <a href="#">VIEW</a>					Physics Forces  <a href="#">VIEW</a>		Physics Magnets  <a href="#">VIEW</a>		Biology Plants B  <a href="#">VIEW</a>	Sustainability Biodiversity  <a href="#">VIEW</a>	

## Year 4

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<b>Autumn term</b>	Biology Group and classify living things FREE TRIAL			Biology Data collection A	Chemistry States of matter							Consolidation
<b>Spring term</b>	Physics Sound					Biology Data collection B	Physics Electricity				Sustainability Energy	Consolidation
<b>Summer term</b>	Biology Data collection C	Biology Habitats		Sustainability Deforestation	Biology The digestive system					Biology Food chains		

## Year 5

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<b>Autumn term</b>	Physics Forces FREE TRIAL					Physics Space					Sustainability Global warming	Consolidation
<b>Spring term</b>	Chemistry Properties of materials			Biology Animals including humans				Biology Life cycles				
<b>Summer term</b>	Biology Reproduction A			Chemistry Reversible and irreversible changes			Sustainability Plastic pollution	Biology Reproduction B				Consolidation

## Year 6

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
<b>Autumn term</b>	Biology Living things and their habitats FREE TRIAL					Physics Electricity						Sustainability Renewable energy
<b>Spring term</b>	Physics Light				Sustainability Light pollution	Biology The circulatory system				Biology Diet, drugs and lifestyle		
<b>Summer term</b>	Biology Variation		Biology Adaptations				Biology Fossils		Consolidation	Themed projects (Year 7 ready)		

St James' CE Primary is in transition. Younger classes are single-age and older classes mixed.

Where classes are mixed, we operate a two-year rolling programme: Cycle A (2023-24, 2025-26 etc) and Cycle B (2024-25, 2026-27). The age-related expectations are the same for both year groups. Teachers adapt to meet the needs of all pupils.



## Featured scientists

Across the Key Stage 1 and 2 Science curriculum, we've planned for children to learn around 25 different scientists. The scientists we've chosen represent diversity across a range of different scientific fields. Some are especially known, such as 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.

Year 3,4 phase			Year 5,6 phase		
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Materials</b> <i>(Autumn Unit 3)</i> Scientist: John Dunlop	<b>Humans</b> <i>(Autumn Unit 2)</i> Scientist: Florence Nightingale	<b>Skeletons</b> <i>(Autumn Unit 1)</i> Scientist: Marie Curie (focussing on her work on x-rays)	<b>Group and classify living things</b> <i>(Autumn Unit 1)</i> Scientist: Jane Goodall	<b>Forces</b> <i>(Autumn Unit 1)</i> Scientist: Isaac Newton, Galileo Galilei	<b>Living things and their habitats</b> <i>(Autumn Unit 1)</i> Scientist: Carl Linnaeus, Sarah Fowler
<b>Animals</b> <i>(Spring Unit 2)</i> Scientist: George Mottershead	<b>Animals</b> <i>(Autumn Unit 3)</i> Scientist: Charles Macintosh	<b>Fossils</b> <i>(Spring Unit 1)</i> Scientist: Mary Anning	<b>Sound</b> <i>(Spring Unit 1)</i> Scientist: Alexander Graham Bell	<b>Space</b> <i>(Autumn Unit 2)</i> Scientist: Galileo Galilei, Copernicus, Maggie Aderin-Pocock	<b>Electricity</b> <i>(Autumn Unit 2)</i> Scientist: Thomas Edison, Nikola Tesla
<b>Plants</b> <i>(Summer Unit 1)</i> Scientist: Jeane Baret		<b>Plants</b> <i>(Summer Unit 1)</i> Scientists: Sir Joseph Banks, Tom Hart-Dyke Career: gardener	<b>Electricity</b> <i>(Spring Unit 3)</i> Scientist: Maria Telkes	<b>Life cycles</b> <i>(Spring Unit 3)</i> Scientist: David Attenborough	<b>Light</b> <i>(Spring Unit 1)</i> Scientist: Alhazen
					<b>Diet, drugs and lifestyle</b> <i>(Spring Unit 4)</i> Scientist: Marie Maynard-Daly
					<b>Variation</b> <i>(Summer Unit 1)</i> Scientist: Charles Darwin



# Age-related expectations: Working scientifically

		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask simple questions</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can verbally state what I am going to investigate.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can observe closely.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can carry out simple tests using non-standard measurements when appropriate.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can gather and record simple data.</li> <li>I can sort objects and living things into groups based on simple properties.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>I can explain what I found out to an adult or a partner.</li> </ul>	<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask simple questions and recognise that they can be answered in different ways.</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can make simple predictions based on a question.</li> <li>I can identify what I will change and keep the same.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can observe carefully, using simple equipment.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can perform simple tests using standard units when appropriate.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can gather and record data in different ways to help answer questions.</li> <li>I can identify and classify.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>I can talk about what I have found out and how they found out. (non-statutory)</li> </ul>	<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask questions and understand there are different enquiry types they could use to answer them.</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can make relevant predictions.</li> <li>I can identify what I will change, observe and keep the same.</li> <li>With support I can set up simple practical enquiries.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can begin to use scientific equipment to make observations.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can carry out tests and simple experiments and take measurements using standard units.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can gather and record data to help in answering questions.</li> <li>I can record findings using simple scientific language, drawings, labelled diagrams, bar charts, and tables.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>I can report on findings from enquiries, including oral and written explanations.</li> </ul>	<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask relevant questions and use different types of scientific enquiries to answer them.</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can set up simple practical enquiries, comparative and fair tests.</li> <li>I can make predictions based on simple scientific knowledge.</li> <li>I can identify what I will change, observe or measure and keep the same.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can make systematic and careful observations.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can gather, record and classify data in a variety of ways to help answer questions.</li> <li>I can record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>I can report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.</li> </ul>	<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask scientific questions and begin to understand which questions would be best suited to each enquiry type.</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can make predictions based on scientific knowledge.</li> <li>With support, I can plan different types of scientific enquiries.</li> <li>Where appropriate, I can identify the dependent, independent and controlled variables.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can use a range of scientific equipment to make systematic and careful observations.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can take accurate measurements using a range of scientific equipment</li> <li>I can start to take repeat readings when appropriate.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can gather, record and classify data with increasing complexity to help answer questions.</li> <li>I can record data using scientific diagrams and labels, classification keys, tables, bar and line graphs.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>I can report and present on findings from enquiries, including conclusions.</li> <li>I can begin to identify causal relationships in oral and written forms such as displays and other presentations.</li> </ul>	<b>Ask questions</b> <ul style="list-style-type: none"> <li>I can ask scientific questions and choose which enquiry type would be best suited to answer them.</li> </ul> <b>Plan</b> <ul style="list-style-type: none"> <li>I can make predictions based on scientific knowledge.</li> <li>I can plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.</li> </ul> <b>Make observations</b> <ul style="list-style-type: none"> <li>I can use a range of scientific equipment to make systematic and careful observations with increased complexity.</li> </ul> <b>Take measurements</b> <ul style="list-style-type: none"> <li>I can take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.</li> </ul> <b>Gather, record and classify data</b> <ul style="list-style-type: none"> <li>I can record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.</li> </ul> <b>Present findings</b> <ul style="list-style-type: none"> <li>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.</li> </ul>

## Vocabulary: Working scientifically

Year 1,2 phase both years	Year 3,4 phase both years	Year 5,6 phase both years
<ul style="list-style-type: none"> <li>• <b>to investigate:</b> to explore something carefully</li> <li>• <b>to sort:</b> to arrange things into groups</li> <li>• <b>to identify:</b> to spot something</li> <li>• <b>to observe:</b> to notice something</li> <li>• <b>to compare:</b> to find similarities and/or differences</li> <li>• <b>to predict:</b> to say that something will happen in the future</li> <li>• <b>data:</b> a collection of information</li> <li>• <b>pattern:</b> something that happens in a repeated and regular way</li> <li>• <b>equipment:</b> the things needed for an investigation</li> </ul>	<ul style="list-style-type: none"> <li>• <b>scientific enquiry:</b> 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)</li> <li>• <b>to record findings:</b> to document the data you have found (eg drawings, labelled diagrams, keys, charts, tables)</li> <li>• <b>to communicate results:</b> to explain what you have found from the data you have recorded</li> <li>• <b>to conclude:</b> to reach a final decision or judgement based on results</li> <li>• <b>to classify:</b> to arrange things in categories based on their characteristics</li> <li>• <b>comparative and fair test:</b> tests which look at the relationship between different variables</li> <li>• <b>relationship:</b> the way in which things are connected</li> <li>• <b>variable:</b> something that can be changed in an experiment</li> <li>• <b>accurate:</b> correct information</li> <li>• <b>systematic:</b> doing something in an ordered, methodical way</li> <li>• <b>secondary sources:</b> somebody else's research which may be necessary when a practical investigation is not possible</li> <li>• <b>practical:</b> actually doing something</li> </ul>	<ul style="list-style-type: none"> <li>• <b>scientific enquiry</b> 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)</li> <li>• <b>evidence:</b> facts or information which indicate if something is true or valid</li> <li>• <b>to justify:</b> to show or prove something</li> <li>• <b>control variable:</b> a variable which needs to be kept the same during an experiment</li> <li>• <b>independent variable:</b> the variable that is being changed during an experiment</li> <li>• <b>dependent variable:</b> the variable being tested or measured during an experiment</li> <li>• <b>repeat readings:</b> repeating an experiment to ensure that the data gathered is reliable and not a fluke</li> <li>• <b>causal relationships:</b> a cause and effect relationship eg the tighter the string, the higher the pitch</li> <li>• <b>degree of trust:</b> the level of confidence in the results of an investigation</li> <li>• <b>further test:</b> 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</li> <li>• <b>to refute:</b> to prove something to be wrong</li> </ul>

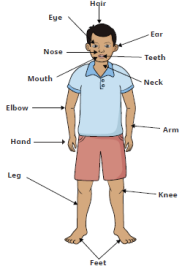



# Age-related expectations: Biology

		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Animals including humans</b> <b>The human body</b> <ul style="list-style-type: none"> <li>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.</li> </ul> <b>Animals</b> <ul style="list-style-type: none"> <li>I can identify and name a variety of common animals, including fish, amphibians, reptiles, birds and mammals.</li> <li>I can identify and name a variety of common animals that are carnivores, herbivores and omnivores.</li> <li>I can describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).</li> </ul> <b>Plants</b> <ul style="list-style-type: none"> <li>I can identify and name a variety of common, wild and garden plants.</li> <li>I can identify and name various deciduous and evergreen trees.</li> <li>I can identify and describe the basic structure of a variety of common flowering plants, including trees.</li> </ul>	<b>Animals including humans</b> <b>Animal needs for survival</b> <ul style="list-style-type: none"> <li>I can find out about and describe the basic needs of animals, including humans, for survival (water, food, air).</li> </ul> <b>Humans</b> <ul style="list-style-type: none"> <li>I can describe the importance for humans of exercise, eating the right amount of different types of food, and hygiene.</li> </ul> <b>Growing up</b> <ul style="list-style-type: none"> <li>I know that animals, including humans, have offspring, which grow into adults.</li> </ul> <b>Plants</b> <b>Light and dark</b> <ul style="list-style-type: none"> <li>I can find out and describe how plants need water, light and suitable temperature to grow and be healthy.</li> </ul> <b>Bulbs and seeds</b> <ul style="list-style-type: none"> <li>I can observe and describe how seeds and bulbs grow into mature plants.</li> </ul> <b>Living things and their habitats</b> <ul style="list-style-type: none"> <li>I can explore and compare differences between things that are living, dead and things that have never been alive.</li> <li>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.</li> <li>I can identify and name a variety of plants and animals in their habitats, including micro-habitats.</li> <li>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.</li> </ul>	<b>Animals including humans</b> <b>Skeletons, Movement</b> <ul style="list-style-type: none"> <li>I can identify that humans and some other animals have skeletons and muscles for support, protection and movement.</li> </ul> <b>Nutrition and diet</b> <ul style="list-style-type: none"> <li>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.</li> </ul> <b>Plants</b> <ul style="list-style-type: none"> <li>I can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.</li> <li>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.</li> <li>I can investigate the way in which water is transported within plants.</li> <li>I can explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</li> </ul>	<b>Animals including humans</b> <b>The digestive system</b> <ul style="list-style-type: none"> <li>I can describe the simple functions of the basic parts of the digestive system in humans.</li> </ul> <b>Food chains</b> <ul style="list-style-type: none"> <li>I can identify the different types of teeth in humans and their simple functions.</li> <li>I can construct and interpret a variety of food chains, identifying producers, predators and prey.</li> </ul> <b>Living things and their habitats</b> <b>Group and classify living things</b> <ul style="list-style-type: none"> <li>I know that living things can be grouped in a variety of ways.</li> <li>I can explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.</li> </ul> <b>Habitats</b> <ul style="list-style-type: none"> <li>I know that environments can change and that this can sometimes pose dangers to living things.</li> </ul>	<b>Animals including humans</b> <ul style="list-style-type: none"> <li>I can describe the changes as humans develop to old age.</li> </ul> <b>Living things and their habitats</b> <b>Life cycles</b> <ul style="list-style-type: none"> <li>I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> </ul> <b>Reproduction A and B</b> <ul style="list-style-type: none"> <li>I can describe the life processes of reproduction in some plants and animals.</li> </ul>	<b>Animals including humans</b> <b>The circulatory system</b> <ul style="list-style-type: none"> <li>I can identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.</li> <li>I can describe the ways in which nutrients and water are transported within animals, including humans.</li> </ul> <b>Diet, drugs and lifestyle</b> <ul style="list-style-type: none"> <li>I am aware of the impact of diet, exercise, drugs and lifestyle on the way my body functions.</li> </ul> <b>Living things and their habitats</b> <ul style="list-style-type: none"> <li>I can describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.</li> <li>I can describe the life processes of reproduction in some plants and animals.</li> </ul> <b>Evolution and inheritance</b> <b>Variation</b> <ul style="list-style-type: none"> <li>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.</li> </ul> <b>Adaptations</b> <ul style="list-style-type: none"> <li>I can identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.</li> </ul> <b>Fossils</b> <ul style="list-style-type: none"> <li>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.</li> </ul>

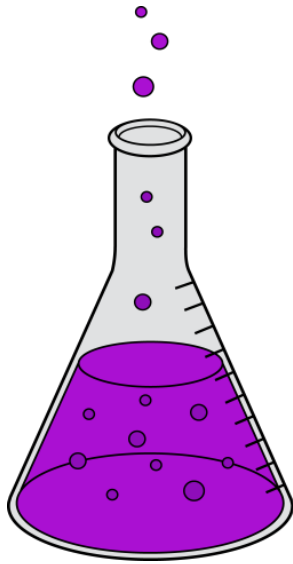


# Vocabulary: Biology

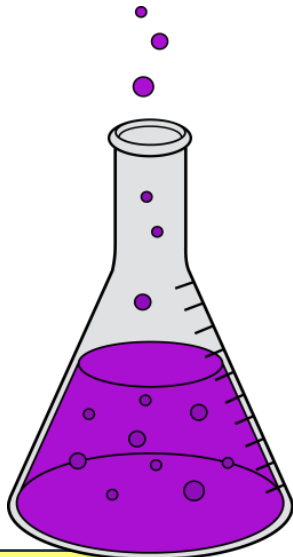
Year 1,2 phase		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Animals including humans</b> <b>The human body (Autumn B1)</b>  <b>Animals (Spring B2)</b> <ul style="list-style-type: none"> <li><b>animal:</b> a living creature</li> <li><b>mammal:</b> an animal with hair or fur on its body</li> <li><b>bird:</b> an animal with feathers, wings and a beak</li> <li><b>fish:</b> animals that live in water and have fins and gills</li> <li><b>amphibian:</b> an animal that lives on land and water</li> <li><b>reptile:</b> an animal with dry scales on its body</li> <li><b>carnivore:</b> an animal that eats other animals</li> <li><b>herbivore:</b> an animal that eats plants</li> <li><b>omnivore:</b> an animal that eats other animals and plants</li> </ul> <b>Plants (Summer B1)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Animals including humans</b> <b>Animal needs for survival (Autumn B1)</b> <ul style="list-style-type: none"> <li><b>basic needs:</b> the things that an animal needs to live (air, water, food, shelter)</li> <li><b>shelter:</b> a place that gives protection from weather or danger</li> <li><b>shelter:</b> a place that gives protection from weather or danger</li> <li><b>mammal:</b> an animal with hair or fur on its body</li> <li><b>bird:</b> an animal with feathers, wings and a beak</li> <li><b>fish:</b> animals that live in water and have fins and gills</li> <li><b>amphibian:</b> an animal that lives on land and water</li> <li><b>reptile:</b> an animal with dry scales on its body</li> <li><b>insect:</b> a small animal that has three body sections and six legs</li> </ul> <b>Humans (Autumn B2)</b> <ul style="list-style-type: none"> <li><b>heart:</b> the muscle inside your chest which pumps blood around the body</li> <li><b>exercise:</b> physical activities that make your body strong and healthy</li> <li><b>germs:</b> tiny living things that can cause illness</li> <li><b>hygiene:</b> keeping yourself and your surroundings clean</li> </ul> <b>Growing up (Summer B2)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Plants</b> <b>Light and dark (Spring B1)</b> <ul style="list-style-type: none"> <li><b>plant:</b> a living thing that usually grows in soil</li> <li><b>flower:</b> the part of a flower that blooms</li> <li><b>seed:</b> a part of a plant that can grow into a new plant</li> <li><b>fruit:</b> a part of a plant that contains seeds</li> <li><b>vegetable:</b> a part of a plant that can be eaten as food</li> <li><b>stem:</b> the long and thin part of a plant that grows from the stem or branch</li> <li><b>leaf:</b> the flat, green part of a plant that grows from the stem or branch</li> <li><b>trunk:</b> the main stem of a tree</li> <li><b>branch:</b> the part of a tree that grows from the trunk</li> </ul> <b>Bulbs and seeds (Summer B1)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Animals including humans</b> <b>Skeletons (Autumn B1)</b> <ul style="list-style-type: none"> <li><b>skeleton:</b> a collection of bones that provide protection and support movement; this appears different in different animals</li> <li><b>exoskeleton:</b> a form of skeleton on the outside of an animal's body that provides support and protection</li> <li><b>spine:</b> a group of small bones stacked on top of each other in the back; also known as the 'backbone'</li> </ul> <b>Movement (Autumn B2)</b> <ul style="list-style-type: none"> <li><b>joint:</b> a point where two or more bones meet</li> <li><b>muscle:</b> works with joints and bones to allow movement</li> <li><b>contracting:</b> a tightening and shortening motion</li> <li><b>relaxing:</b> a relaxing and lengthening motion</li> </ul> <b>Nutrition and diet (Autumn B3)</b> <ul style="list-style-type: none"> <li><b>diet:</b> the food a living thing needs</li> <li><b>balanced diet:</b> a diet that fulfills a person's nutritional needs</li> <li><b>nutrition:</b> taking in and using food to keep the body healthy</li> </ul> <b>Plants (Summer B1, B4)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Animals including humans</b> <b>The digestive system (Summer B4)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Food chains (Summer B5)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Living things and their habitats</b> <b>Group and classify living things (Autumn B1)</b> <ul style="list-style-type: none"> <li><b>vertebrate:</b> an animal with a spine</li> <li><b>invertebrate:</b> an animal without a spine</li> <li><b>mammal:</b> an animal with a spine, fur or hair on its body and feeds its young on milk</li> <li><b>bird:</b> an animal with a spine, feathers, wings and beak</li> <li><b>fish:</b> animals with a spine that live in water and have fins and gills; most fish have scales</li> <li><b>amphibian:</b> an animal with a spine that lives on land and in water</li> <li><b>reptile:</b> an animal with a spine and dry scales on its body</li> <li><b>flowering plant:</b> a plant that can produce flowers and fruit</li> <li><b>non-flowering plant:</b> a plant that does not produce flowers or fruit</li> </ul> <b>Habitats (Summer B2)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Animals including humans</b> <b>(Spring B2)</b> <ul style="list-style-type: none"> <li><b>foetus:</b> an unborn baby growing inside the mother's womb</li> <li><b>womb:</b> the organ in mammals in which a baby develops</li> <li><b>period:</b> normal bleeding from the vagina that is part of a female's monthly cycle</li> <li><b>reproduce:</b> to produce offspring</li> <li><b>hormone:</b> a chemical released by the body that causes physical and emotional changes during puberty</li> <li><b>life expectancy:</b> the average time a person may expect to live</li> <li><b>gestation:</b> the period of time that a foetus develops in its mother's womb</li> </ul> <b>Living things and their habitats</b> <b>Life cycles (Spring B3)</b> <ul style="list-style-type: none"> <li><b>life cycle:</b> a series of stages a living thing goes through during its life</li> <li><b>offspring:</b> the young of a living thing</li> <li><b>metamorphosis:</b> the process by which the young form of an insect or amphibian changes into a distinct adult form</li> </ul> <b>Reproduction A (Summer B1) and B (Summer B4)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Animals including humans</b> <b>The circulatory system (Spring B3)</b> <ul style="list-style-type: none"> <li><b>circulatory system:</b> parts of the body that work together to move blood around the body</li> <li><b>heart:</b> the organ responsible for pumping blood around the body</li> <li><b>blood vessels:</b> tubes within the body that carry blood</li> <li><b>red blood cells:</b> part of the blood that carries oxygen and removes waste products</li> <li><b>white blood cells:</b> part of the blood that fights viruses and bacteria</li> <li><b>oxygenated blood:</b> blood that is carrying lots of oxygen</li> <li><b>deoxygenated blood:</b> blood that is carrying little oxygen</li> </ul> <b>Diet, drugs and lifestyle (Spring B4)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Living things and their habitats (Autumn B1)</b> <ul style="list-style-type: none"> <li><b>organism:</b> a living thing such as an animal or a plant</li> <li><b>classification key:</b> a way of separating organisms into groups or types</li> <li><b>classification:</b> a method of arranging organisms into groups</li> <li><b>characteristics:</b> features of an organism</li> <li><b>microorganism:</b> tiny organisms such as bacteria, viruses and fungi</li> <li><b>taxonomy:</b> the science of naming, describing and classifying organisms</li> </ul> <b>Evolution and inheritance</b> <b>Variation (Summer B1)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Adaptations (Summer B2)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Fossils (Summer B3)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>
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<div> <p>To be updated when White Rose published materials are available.</p> </div>					

	<p><b>Living things and their habitats</b> <i>(Spring B2)</i></p> <ul style="list-style-type: none"><li>• <b>habitat:</b> a place where an animal or plant lives</li><li>• <b>deciduous:</b> a tree that loses its leaves during autumn</li><li>• <b>evergreen:</b> a tree that keeps its leaves all year round</li><li>• <b>microhabitat:</b> a very small habitat</li><li>• <b>diet:</b> the food eaten by an animal</li><li>• <b>food chain:</b> the order in which energy is passed from one plant or animal to another when they are eaten</li><li>• <b>living:</b> something that is alive</li><li>• <b>dead:</b> something that was once living but is now not alive</li><li>• <b>never alive:</b> something that has never been living</li></ul>				
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## Age-related expectations: Chemistry

Year 1		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Materials (Autumn B3)</b> <ul style="list-style-type: none"> <li>I can distinguish between an object and the materials from which it is made.</li> <li>I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</li> <li>I can describe the simple physical properties of a variety of everyday materials.</li> <li>I can compare and group together a variety of everyday materials on the basis of their simple physical properties.</li> </ul>	<b>Materials (Autumn B3)</b> <ul style="list-style-type: none"> <li>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.</li> <li>I can find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.</li> </ul>	<b>Rocks</b> <p><b>Rocks</b></p> <ul style="list-style-type: none"> <li>I can compare and group different rocks on the basis of their appearance and simple physical properties.</li> </ul> <p><b>Fossils</b></p> <ul style="list-style-type: none"> <li>I can describe in simple terms how fossils are formed when things that have lived are trapped within rock.</li> </ul> <p><b>Soils</b></p> <ul style="list-style-type: none"> <li>I can recognise that soils are made from rocks and organic matter.</li> </ul>	<b>States of matter</b> <ul style="list-style-type: none"> <li>I can compare and group materials together, according to whether they are solids, liquids or gases.</li> <li>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).</li> <li>I can identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.</li> </ul>	<b>Properties and changes of materials</b> <p><b>Properties of materials</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>I know that some materials will dissolve in liquid to form a solution.</li> <li>I can describe how to recover a substance from a solution.</li> <li>I can use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</li> <li>I can give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</li> </ul> <p><b>Reversible and irreversible changes</b></p> <ul style="list-style-type: none"> <li>I can demonstrate that dissolving, mixing and changes of state are reversible changes.</li> <li>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.</li> </ul>	

# Vocabulary: Chemistry

Year 1,2 phase		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Materials (Autumn B3)</b> <ul style="list-style-type: none"> <li><b>material:</b> what an object is made from</li> <li><b>soft:</b> a material that can easily change shape or is gentle to touch</li> <li><b>hard:</b> not easily broken or bent</li> <li><b>shiny:</b> a smooth surface that can reflect light easily</li> <li><b>dull:</b> not clear, bright or shiny</li> <li><b>rough:</b> a bumpy or uneven surface to touch</li> <li><b>smooth:</b> an even surface to touch</li> <li><b>melt:</b> when a solid changes to a liquid</li> <li><b>freeze:</b> when a liquid changes to a solid</li> </ul>	<b>Materials (Autumn B3)</b> <ul style="list-style-type: none"> <li><b>natural material:</b> a material that comes from animals, plants or the Earth</li> <li><b>man-made material:</b> a material made by humans</li> <li><b>recycle:</b> to change rubbish into a material that can be used again</li> <li><b>flexible:</b> can change shape easily</li> <li><b>rigid:</b> cannot change shape easily</li> <li><b>brittle:</b> can be easily broken</li> <li><b>transparent:</b> materials you can see through</li> <li><b>opaque:</b> materials you cannot see through</li> <li><b>fabric:</b> a material made from weaving or knitting threads together</li> </ul>	<b>Rocks</b> <b>Rocks (Autumn B5)</b> <ul style="list-style-type: none"> <li><b>rock:</b> a hard material made from one or more minerals</li> <li><b>mineral:</b> a natural substance that makes up rock</li> <li><b>crystal:</b> a clear, transparent mineral</li> <li><b>grain:</b> a rough texture in a rock</li> <li><b>layers:</b> sheets of rock that sit on top of each other (like layers of paper)</li> <li><b>texture:</b> what something looks and feels like</li> <li><b>reaction:</b> a change which can be observed (temperature, bubbles or colour)</li> <li><b>weathering:</b> the breaking down of rocks over time</li> </ul> <b>Fossils (Spring B1)</b> <ul style="list-style-type: none"> <li><b>fossil:</b> the remains or trace of a living thing that lived a long time ago</li> <li><b>fossilisation:</b> the process through which a fossil is formed</li> <li><b>sediment:</b> small pieces of soil, sand, gravel and small rocks</li> </ul> <b>Soils (Spring B2)</b> <ul style="list-style-type: none"> <li><b>soil:</b> a mixture of small rocks, organic matter and water</li> <li><b>organic matter:</b> the remains of dead animals and plants</li> <li><b>nutrients:</b> substances found in soil which help plants grow</li> <li><b>absorb:</b> to take in water</li> </ul>	<b>States of matter (Autumn B3)</b> <ul style="list-style-type: none"> <li><b>solid:</b> a material or object with a defined shape and a fixed volume</li> <li><b>liquid:</b> a state of matter with no fixed shape but a fixed volume</li> <li><b>gas:</b> a state of matter with no fixed shape and no fixed volume</li> <li><b>volume:</b> the amount of space a solid, liquid or gas takes up</li> <li><b>states of matter:</b> these are solids liquids or gases</li> <li><b>condensation:</b> that state change where gas turns to a liquid</li> <li><b>evaporation:</b> the state change when a liquid turns to a gas</li> <li><b>water cycle:</b> the natural recycling and movement of water on planet Earth</li> <li><b>precipitation:</b> liquid or frozen water that falls back to Earth from the atmosphere (eg rain, hail,sleet or snow)</li> <li><b>water vapour:</b> the gaseous state of water</li> </ul>	<b>Properties and changes of materials</b> <b>Properties of materials (Spring B1)</b> <ul style="list-style-type: none"> <li><b>electrical conductor:</b> a material that lets electricity pass through it</li> <li><b>electrical insulator:</b> a material that does not let electricity pass through it</li> <li><b>thermal insulator:</b> a material that does not let heat pass through it easily or quickly</li> <li><b>thermometer:</b> a piece of equipment used to measure temperature</li> <li><b>anomalous result:</b> a result that does not fit in with the pattern of other results</li> </ul> <b>Reversible and irreversible changes (Summer B2)</b> <ul style="list-style-type: none"> <li>TBC</li> </ul>	

To be updated when  
White Rose  
published materials  
are available.



## Age-related expectations: Physics

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



# Vocabulary: Physics

Year 1,2 phase		Year 3,4 phase		Year 5,6 phase	
Year 1	Year 2	Year A	Year B	Year A	Year B
<b>Seasonal changes</b> ( <i>Autumn B2, B4; Spring B4; Summer B4</i> ) <ul style="list-style-type: none"> <li><b>season:</b> a part of the year</li> <li><b>weather:</b> the conditions outside</li> <li><b>daylight:</b> when it is light outside</li> <li><b>night:</b> when there is no daylight</li> <li><b>autumn:</b> the season after summer and before winter</li> <li><b>winter:</b> the season after autumn and before spring</li> <li><b>spring:</b> the season after winter and before summer</li> <li><b>summer:</b> the season after spring and before autumn</li> </ul>		<b>Light</b> ( <i>Spring B3</i> ) <ul style="list-style-type: none"> <li><b>light:</b> energy that is needed to see</li> <li><b>light sources:</b> objects that give out light</li> <li><b>natural light sources:</b> objects in nature that give out light</li> <li><b>artificial light sources:</b> made by humans</li> <li><b>reflection:</b> when light bounces off an object</li> <li><b>opaque:</b> an object or material that does not allow any light to pass through it</li> <li><b>translucent:</b> an object or material that allows some light to pass through it</li> <li><b>transparent:</b> an object or material that allows all light to pass through it</li> <li><b>shadow:</b> a dark area caused by an object blocking a source of light</li> </ul> <b>Forces and magnets</b> <b>Forces</b> ( <i>Summer B2</i> ) <ul style="list-style-type: none"> <li>TBC</li> </ul> <b>Magnets</b> ( <i>Summer B3</i> ) <ul style="list-style-type: none"> <li>TBC</li> </ul>	<b>Sound</b> ( <i>Spring B1</i> ) <ul style="list-style-type: none"> <li><b>sound:</b> vibrations that travel through the air, or another medium, and are heard when they reach an ear</li> <li><b>vibration:</b> a quick back-and-forth movement</li> <li><b>ear:</b> an organ in humans (and many other animals) that detects vibrations, allowing hearing</li> <li><b>volume:</b> how loud or quiet a sound is</li> <li><b>pitch:</b> how high or low a sound is</li> <li><b>decibel (db):</b> a measure of the loudness of a sound</li> <li><b>insulate:</b> to protect something from the transfer of heat, sound or electricity</li> <li><b>background noise:</b> any type of noise that is not the sound that you are listening to or measuring</li> </ul> <b>Electricity</b> ( <i>Spring B3</i> ) <ul style="list-style-type: none"> <li><b>circuit:</b> a closed path that energy can flow through</li> <li><b>cell:</b> a portable store of energy</li> <li><b>switch:</b> a device that opens and closes an electrical circuit</li> <li><b>conductor:</b> a material that allows energy to flow through it</li> <li><b>insulator:</b> a material that does not allow energy to flow through it</li> </ul>	<b>Forces</b> ( <i>Autumn B1</i> ) <ul style="list-style-type: none"> <li><b>friction:</b> the contact force between two surfaces that are touching each other</li> <li><b>air resistance:</b> a type of friction between air and another object</li> <li><b>water resistance:</b> a type of friction between a liquid and another object</li> <li><b>gravity:</b> an invisible force that pulls things down to the centre of the Earth (or other planets)</li> <li><b>repeatability:</b> the likelihood of getting similar results if the experiment is carried out again</li> <li><b>anomalous result:</b> a result that does not fit the pattern; in maths, this is called an outlier</li> <li><b>lever:</b> a rigid bar resting on a pivot, used to move a heavy load</li> <li><b>gear:</b> a wheel and axle that has teeth along the wheel; mostly used in machines to increase speed</li> </ul> <b>Earth and space</b> ( <i>Autumn B2</i> ) <ul style="list-style-type: none"> <li>the Solar System: a collection of the eight planets and their moons, which orbit the Sun</li> <li><b>planets:</b> large, spherical objects that orbit stars</li> <li><b>stars:</b> large balls of burning gas that release heat and light</li> <li><b>orbit:</b> the path an object takes around another object</li> <li><b>model:</b> a physical representation of an idea or process</li> <li><b>heliocentric:</b> a model that proposed that the Sun was at the centre of the Solar System.</li> <li><b>geocentric:</b> a model that proposed that the Earth was at the centre of the Solar System.</li> <li><b>night:</b> when part of the Earth is facing away from the Sun</li> <li><b>day:</b> when part of the Earth is facing towards the Sun</li> </ul>	<b>Electricity</b> ( <i>Autumn B2</i> ) <ul style="list-style-type: none"> <li><b>series circuit:</b> a circuit where all the components are in one single loop</li> <li><b>current:</b> the flow of electricity in a circuit</li> <li><b>voltage:</b> a measure of how strong the current is in a circuit; this is provided by the cell/battery</li> </ul> <b>Light</b> ( <i>Spring B1</i> ) <ul style="list-style-type: none"> <li><b>light source:</b> object that produces light</li> <li><b>reflection:</b> the return of light from a material or surface</li> <li><b>ray diagram:</b> a diagram that shows how light travels</li> <li><b>shadow:</b> a dark area caused by an object blocking a source of light</li> <li><b>solar eclipse:</b> when the Moon passes between Earth and the Sun and blocks the sunlight from reaching the Earth; this casts a shadow of the Moon on the Earth</li> <li><b>medium:</b> any substance which can allow sound or light to pass through it</li> </ul>

To be updated when White Rose published materials are available.

## Appendix: scientific enquiry types

Identifying,  
classifying  
& grouping



# Comparative & fair testing



[www.fascinate.manchester.ac.uk](http://www.fascinate.manchester.ac.uk)



Research  
using  
secondary  
sources

[www.fascinate.manchester.ac.uk](http://www.fascinate.manchester.ac.uk)



# Pattern seeking



[www.fascinate.manchester.ac.uk](http://www.fascinate.manchester.ac.uk)



# PHYSICS

We are learning about **physics**.

We are **physicists**.

**Physics** is the study of forces (pushes and pulls) and energy.





# CHEMISTRY

We are learning about **chemistry**.

We are **chemists**.

**Chemistry** is the study of the properties of substances and the changes they go through.



# BIOLOGY

We are learning about **biology**.

We are **biologists**.

**Biology** is the study of living things.

