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The Learning Challenge Curriculum:
What are the main principles?

The Learning Challenge™ CURRICULUM

- The Learning Challenge concept is built around the principle of greater **learner involvement** in their work. It requires deep thinking and encourages learners to work using a question as the starting point.
- In designing the curriculum, teachers and learners are using a **prime learning challenge**, expressed as a question, as the starting point. Using the information gained from pre-learning tasks and the school's context a series of **subsidiary challenges** are then planned. Each subsidiary learning challenge is also expressed as a question. Importantly, the learning challenges need to make sense to the learners and be something that is within their immediate understanding.
- **Pre-learning tasks** ensure that learners are directly involved in the planning process. Well planned pre-learning tasks should help to bring out what learners already know; what misconceptions they may have and what really interests them. Teachers should take account of the outcomes from pre-learning tasks to plan the subsidiary learning challenges for each major area of study.
- Continuity and progression in the curriculum will be built around a set of matrices known as essential knowledge, understanding and key skills within subject disciplines. These are broken into year group expectations and have additional challenges for able learners. The '**Essential Knowledge, Skills and Understanding**' matrices within the Learning Challenge Curriculum will allow school to guarantee that the learners' essential skills are being developed, alongside National Curriculum requirements (where appropriate), whilst allowing individual schools to have a great deal of autonomy with their methodology.
- In addition, there is an expectation that teachers **apply English, mathematics and ICT** skills where it is appropriate to do so. The main idea is to use the knowledge, skills and understanding matrices for each subject to bring to teachers' attention the level of work expected around each learning challenge. In addition there should be careful consideration given to the quality of work produced by learners in the core subject areas.
- Time for learners to reflect or review their learning is central to the whole process. This is in keeping with the 'Learning to Learn' principles where **reflection** is seen as a very important part of individuals' learning programme. Within the Learning Challenge Curriculum it is suggested that the final subsidiary learning challenge is handed over for learners to reflect on their learning. The idea is that learners present their learning back to the rest of the class or another appropriate audience - making the most of their oracy and ICT skills to do so. Initially learners may require a great deal of direction so the reflection time may need to be presented in the form of a question which helps them to review their work.

Focus Education (UK) Ltd: The Team

This new Learning Challenge Curriculum, taking account of the new National Curriculum (2014) has been created by the Focus Education team.

- Clive Davies, Director Focus Education
- Simon Camby, Chief Executive, Focus Academy Trust
- Keith Adams, Focus Education Consultant
- Paul Allen, Teacher, English Martyrs Catholic Primary, Derbyshire
- Jo Davies, Headteacher, Carr Mill Primary, St Helens
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- Anne McNally, recently retired Headteacher, Wigan
- Tim Nelson, Focus Education Consultant
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- Helen Rowland, Academy Improvement Officer, Focus Academy Trust

Contents

Notes:

All the main areas for each age group have been taken directly from the new National Curriculum. The knowledge, skills and understanding statements come as a result of looking carefully at the requirements for each age group set out in the same documentation.

There are some 'non-statutory' units of work included in this publication. These have been included on advice from teachers in a wide range of schools. Note that these are outside the scope of the prescribed curriculum.

Introduction

- This scheme of work has been developed to ensure that you will have full coverage of the new National Curriculum. It follows the programmes of study for each year very carefully and provides the right balance between working scientifically and learning scientific facts.
- Each set of Learning Challenges then links directly to the science knowledge, skills and understanding to ensure that learning is progressive and continuous.
- There has been an attempt to link either creative or expressive arts into each scientific learning challenge so that there is breadth and balance in the coverage as a whole.
- The art, DT, music and dance knowledge, skills and understanding have been taken from the 'Weaving KSU into the new National Curriculum' book which ensures that you will have progression and continuity in these subject areas also.
- The initial or main questions outlined in the examples that follow are obviously the starting points for you to consider. The ethos that underpins the Learning Challenge approach requires teachers to check on what children already know and then invite them to think of their own questions. This approach is still highly desirable but teachers need to ensure that they are meeting the National Curriculum requirements. **Very importantly ensure that all content absolutely meets your context**.
- Each Learning Challenge has a suggested 'wow' and its own suggested reflection. By using these you will get a more complete level of challenge for the pupils.
- You will also note that every opportunity has been taken to help children apply literacy and numeracy skills where it is possible to do so.
- Finally, every attempt has been made to bring science to life by taking starting points from the children's context. In this way it is hoped that science will be viewed as exciting and interesting as well as fun.

Learning Challenges – The Principles

What are the main principles?

- The Learning Challenge concept is built around the principle of greater learner involvement in their work. It requires deep thinking and encourages learners to work using a question as the starting point.
- In designing the curriculum teachers and learners are using a prime learning challenge, expressed as a question, as the starting point. Using the information gained from pre- learning tasks and the school's context a series of subsidiary challenges are then planned. Each subsidiary learning challenge is also expressed as a question. See how this works in the scheme of work provided.
- The subsidiary learning challenge is normally expected to last for one week but this does not need to be the case. However, initially it may be useful for the learners and indeed the staff to get used to the weekly learning challenge. The important point is that the learning challenges need to make sense to the learners and be something that is within their immediate understanding.

Learning Challenges – The Principles

How do the Pre- Learning Tasks Work?

- Pre-Learning Tasks ensure that learners are directly involved in the planning process. Well planned pre-learning tasks should help to bring out what learners already know; what misconceptions they may have and what really interests them.
- Teachers should take account of the outcomes from pre-learning tasks to plan the subsidiary learning challenges for each major area of study. It should help teachers recognise what transferable skills learners have already developed that could be used to initiate new learning with a level of confidence.
- Pre-Learning tasks could take many different forms and can last for as long or as short as required. Some may be written tasks others oral. Mind mapping is one method that has been used successfully by many schools. Using pre-learning tasks as part of a school's programme of home learning will help to get parents and carers directly involved in their children's learning.

Learning Challenges – The Principles

How do we ensure that pupils are improving their knowledge and understanding and developing appropriate skills?

- Continuity and Progression in the curriculum will be built around a set of matrices known as essential 'knowledge, skills and understanding' within subject disciplines. These are broken into Year group expectations and have additional challenges for able learners. The Knowledge, Skills and Understanding' matrices within the Learning Challenge Curriculum (Weaving Knowledge, Skills and Understanding into the new National Curriculum) will allow school to guarantee that the learners' essential skills are being developed, alongside National Curriculum requirements (where appropriate), whilst allowing individual schools to have a great deal of autonomy with their methodology.

- In addition, there is an expectation that teachers apply English, mathematics and ICT skills where it is appropriate to do so.

Learning Challenges – The Principles

How are learners presented with opportunities to reflect on their learning?

- Time for learners to reflect or review their learning is central to the whole process. This is in keeping with the 'Learning to Learn' principles where reflection is seen as a very important part of individuals' learning programme.
- Within the Learning Challenge Curriculum it is suggested that the final subsidiary learning challenge is handed over for learners to reflect on their learning. The idea is that learners present their learning back to the rest of the class or another appropriate audience - making the most of their oracy and ICT skills to do so. Initially, learners may require a great deal of direction so the reflection time may need to be presented in the form of a question which helps them to review their work.
- Although reflection is seen as a concluding part of the prime learning challenge it is hoped that that there will be continual opportunities for learners to reflect frequently, especially as each subsidiary learning challenge comes to an end. Ideally, there should be a good deal of learner autonomy evident during reflection time.

Science Programme of Study: Key Stage 1

- The principal focus of science teaching in **key stage 1** is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them. They should be encouraged to be curious and ask questions about what they notice. They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information. They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways. Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.
- 'Working scientifically' is described separately in the programme of study, but must **always** be taught through and clearly related to the teaching of substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
- Pupils should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Science
Learning Challenges

Year 1

Year 1 Statutory Requirements

Working Scientifically (Y1 & 2)	Plants	Animals, including humans	Everyday materials	Seasonal Changes
• Ask simple questions and recognise that they can be answered in different ways; • Observe carefully, using simple equipment; • Identifying and classifying • Using their observations and ideas to suggest answers to their questions; • Gathering and recording data to help in answering questions.	• Identify and name a variety of common, wild and green plants, including deciduous and evergreen trees; • Identify and describe the basic structure of a variety of common flowering plants, including trees.	• Identify and name a variety of common animals, including fish, amphibians, reptiles, birds and mammals; • Identify and name a variety of common animals that are carnivores, herbivores and omnivores; • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets); • Identify, name, draw and label the basic parts of the human body and say which part of the human body is associated with each sense.	• Distinguish between an object and the materials from which it is made; • Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock; • Describe the simple physical properties of a variety of everyday materials; • Compare and group together a variety of everyday materials on the basis of their simple physical properties.	• Observe changes across the four seasons; • Observe and describe weather associated with the seasons and how day length varies.

Science: Year 1 Overview

<table>
<tr><th colspan="5">Key Features</th></tr>
<tr><td rowspan="2">YEAR 1</td><td>PLANTS</td><td>ANIMALS (including Humans)</td><td>EVERYDAY MATERIALS</td><td>SEASONAL CHANGES</td></tr>
<tr><td>• Identification and labelling, including trees

• Structure of plants, including roots, stem, flower, etc.</td><td>• Identification and labelling a variety of common animals (fish, amphibians, reptiles, birds and mammals)

• Know carnivores, herbivores and omnivores

• How to care for pets

• Name parts of the human body</td><td>• Identify and name a range of materials (wood, plastic, glass, metal, water and rock;

• Classifying and grouping according to a range of physical properties</td><td>• Features of day and night including temperature

• Weather, associated with seasons</td></tr>
<tr><td rowspan="2">Possible Learning Challenges</td><td></td><td>• Why are humans not like tigers?</td><td rowspan="2">• Which materials should the Three Little Pigs have used to build their house? or
• What do Aliens think of life on planet Earth?</td><td rowspan="2">• Why does it get dark earlier in winter? or
• How do the seasons impact on what we do?</td></tr>
<tr><td colspan="2">• Which birds and plants would Little Red Riding Hood find in our park?</td></tr>
</table>

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 1 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 1

Observing closely	Performing Tests	Identifying and Classifying	Recording findings
• Can they talk about what they <see, touch, smell, hear or taste>? • Can they use simple equipment to help them make observations?	• Can they perform a simple test? • Can they tell other people about what they have done?	• Can they identify and classify things they observe? • Can they think of some questions to ask? • Can they answer some scientific questions? • Can they give a simple reason for their answers? • Can they explain what they have found out?	• Can they show their work using pictures, labels and captions? • Can they record their findings using standard units? • Can they put some information in a chart or table?

Year 1 (Challenging)

• Can they find out by watching, listening, tasting, smelling and touching?	• Can they give a simple reason for their answers?	• Can they talk about similarities and differences? • Can they explain what they have found out using scientific vocabulary?	• Can they use ICT to show their working? • Can they make accurate measurements?

Knowledge, Skills and Understanding breakdown for Plants and Animals, including humans

Year 1

Plants	Animals, including humans	
• Can they name the petals, stem, leaf, bulb, flower, seed, stem and root of a plant? • Can they identify and name a range of common plants and trees? • Can they recognise deciduous and evergreen trees? • Can they name the trunk, branches and root of a tree? • Can they describe the parts of a plant (roots, stem, leaves, flowers)?	• Can they point out some of the differences between different animals? • Can they sort photographs of living things and non-living things? • Can they identify and name a variety of common animals? (birds, fish, amphibians, reptiles, mammals, invertebrates) • Can they describe how an animal is suited to its environment? • Can they identify and name a variety of common animals that are carnivores, herbivores and omnivores?	• Can they name the parts of the human body that they can see? • Can they draw & label basic parts of the human body? • Can they identify the main parts of the human body and link them to their senses? • Can they name the parts of an animal's body? • Can they name a range of domestic animals? • Can they classify animals by what they eat? (carnivore, herbivore, omnivore) • Can they compare the bodies of different animals?

Year 1 (Challenging)

• Can they name the main parts of a flowering plant?	• Can they begin to classify animals according to a number of given criteria? • Can they point out differences between living things and non-living things?	• Can they name some parts of the human body that cannot be seen? • Can they say why certain animals have certain characteristics? • Can they name a range of wild animals?

Knowledge, Skills and Understanding breakdown for Everyday Materials

Year 1

Everyday materials (classifying and grouping)

- Can they distinguish between an object and the material from which it is made?
- Can they describe materials using their senses?
- Can they describe materials using their senses, using specific scientific words?
- Can they explain what material objects are made from?
- Can they explain why a material might be useful for a specific job?
- Can they name some different everyday materials? e.g. wood, plastic, metal, water and rock
- Can they sort materials into groups by a given criteria?
- Can they explain how solid shapes can be changed by squashing, bending, twisting and stretching?

Year 1 (Challenging)

- Can they describe things that are similar and different between materials?
- Can they explain what happens to certain materials when they are heated, e.g. bread, ice, chocolate?
- Can they explain what happens to certain materials when they are cooled, e.g. jelly, heated chocolate?

Knowledge, Skills and Understanding breakdown for Seasonal Changes

Year 1

Seasonal Changes

- Can they observe changes across the four seasons?
- Can they name the four seasons in order?
- Can they observe and describe weather associated with the seasons?
- Can they observe and describe how day length varies?

Year 1 (Challenging)

- Can they observe features in the environment and explain that these are related to a specific season?
- Can they observe and talk about changes in the weather?
- Can they talk about weather variation in different parts of the world?

Year 1: Which birds and plants would Little Red Riding Hood find in *our park? (*replace with your local park or school grounds)

KS1 Science (Y1 Plants)

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

KS1 Science (Animals, including humans)

- Identify and name a variety of common animals, including fish, amphibians, reptiles, **birds** and mammals;

WOW: *Read: Children visit their nearest woods or park and have the story of Little Red Riding Hood read to them.*

LC1	Why would Little Red Riding Hood find our park a very interesting place to be?
LC2	How can we identify the birds that we find in our nearest park or around our school?
LC3	What can we do to try and attract birds to our school?
LC4	How can we keep a record of the different types of plants and trees we find at our nearest park or around the school?
LC5	How can we capture the beauty of the birds, plants and trees we see?
LC6	Can we name the different parts of the plants and trees we see?
LC7	Reflection: How can you put together a power point presentation of the birds, plants and trees seen?

Possibilities for working scientifically – LC2 and LC6- Observing closely, using magnifying glasses, and comparing and contrasting familiar plants; describing how they were able to identify and group them, and drawing diagrams showing the parts of different plants and trees. Children to keep records of how plants have changed over time, for example, the leaves falling off trees and buds opening; and compare and contrast how different plants change over time.

Literacy Link: This LC should take place at the same time as the class is looking at 'Traditional Tales'.
There will opportunities for children to ask their own questions based on plants and birds and to create an on-going 'Research Book' in the Floor Book style.

Numeracy Link: Children to keep a tally of the different birds and plants that they see.

Creative Art Link: Children will design and create their own bird tables and make mixtures with seeds, nuts, etc. to hang from them.

Creative Art Link: This provides opportunities for children to sketch the plants and trees they have observed.

Year 1: Which birds and plants would Little Red Riding Hood find in our park?

Year 1: Science, Art & Design and Design Technology Knowledge, Skills and Understanding

Science
Working Scientifically/ Plants and Birds

- Can they talk about what they <see, touch, smell, hear or taste>?
- Can they use simple equipment to help them make observations?
- Can they put some information in a chart or table?
- Can they identify and classify things they observe?
- Can they think of some questions to ask?
- Can they answer some scientific questions?
- Can they give a simple reason for their answers?
- Can they explain what they have found out?

- Can they name the petals, stem, leaf and root of a plant?
- Can they identify and name a range of common plants and trees?
- Can they recognise deciduous and evergreen trees?
- Can they describe the parts of a plant? (roots, stem, leaves, flowers)
- Can they sort some plants by size?

Design Technology

- Can they think of some ideas of their own?
- Can they explain what they want to do?
- Can they use pictures and words to plan?
- Can they explain what they are making?
- Which tools are they using?
- Can they make a structure/model using different materials?
- Is their work tidy?
- Can they make their model stronger if it needs to be?

Year 1 (Challenging)

- Can they find out by watching, listening, tasting, smelling and touching?
- Can they talk about similarities and differences?
- Can they explain what they have found out using scientific vocabulary?
- Can they use ICT to show their working?
- Can they make accurate measurements?

- Can they name the main parts of a flowering plant?
- Can they sort some plants by those that can be eaten and those that cannot?

Art & Design

- Can they draw using pencil and crayons?
- Can they draw lines of different shapes and thickness, using 2 different grades of pencil?

Year 1: Why are humans not like tigers?

KS1 Science (Y1 Animals, including Humans)

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

WOW: *Read 'The Tiger who came to tea' and 'Zoo'*
Visit to a zoo (if possible)

LC1	Why do we call some animals 'wild'?
LC2	What would you ask a zoo keeper?
LC3	Why would it not be sensible for all animals to live in England?
LC4	How are we humans different from most animals?
LC5	What do we mean by carnivore, herbivore and omnivore?
LC6	What do we need to do to keep our pets happy?
LC7	Who are the minibeasts that live in our school grounds?
LC8	Reflection: Can you create your own non fiction book on a 'Visit to the Zoo'?

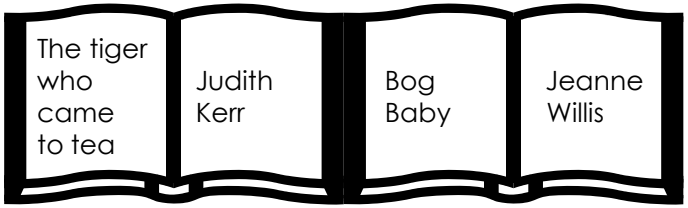
Working scientifically: using their observations to compare and contrast animals at first hand or through videos and photographs, describing how they identify and group them; grouping animals according to what they eat; and using their senses to compare different textures, sounds and smells.

Literacy Link: Read the well known books associated with features of different animals and get children to talk about their favourite animals and the way they live.

Literacy Link: Pupils to create their own fact files based on a chosen wild animal.
They will also think of a specific question to ask a zoo keeper (ideally to find out when they are on their zoo visit or to work out from their own research). This will be linked to the reflection week when they put this information into a non-fiction book.

Expressive Art Link: This LC will also provide opportunities to discuss humans' ability to work together. To show this off they will create a special dance about wild animals and perform it to Years 2 and EYFS.

Creative Art Link: This LC will provide opportunities to talk about our ability to draw and write about other things. This will then be linked to the opportunity to make a self portrait.



Year 1: Why are humans not like tigers?

Year 1: Science, Art and Dance Knowledge, Skills and Understanding

Science
Working Scientifically/ Animals, including humans

- Can they talk about what they <see, touch, smell, hear or taste>?
- Can they use simple equipment to help them make observations?
- Can they put some information in a chart or table?
- Can they identify and classify things they observe?
- Can they think of some questions to ask?
- Can they answer some scientific questions?
- Can they give a simple reason for their answers?
- Can they explain what they have found out?

- Can they point out some of the differences between different animals?
- Can they sort photographs of living things and non-living things?
- Can they classify common animals? (birds, fish, amphibians, reptiles, mammals, invertebrates)
- Can they describe how an animal is suited to its environment?
- Can they name the parts of the human body that they can see?
- Can they identify the main parts of the human body and link them to their senses?
- Can they name the parts of an animal's body?
- Can they name a range of domestic animals?
- Can they classify animals by what they eat? (carnivore, herbivore, omnivore)
- Can they compare the bodies of different animals?
- Can they sort some animals by body covering, eg, scales, fur and skin?

Year 1 (Challenging)

- Can they find out by watching, listening, tasting, smelling and touching?
- Can they talk about similarities and differences?
- Can they explain what they have found out using scientific vocabulary?
- Can they use ICT to show their working?
- Can they make accurate measurements?

- Can they begin to classify animals according to a number of given criteria?
- Can they name some parts of the human body that cannot be seen?
- Can they say why certain animals have certain characteristics?
- Can they name a range of wild animals?

Art & Design

- Can they communicate something about themselves in their drawing?
- Can they create moods in their drawings?
- Can they draw using pencil and crayons?
- Can they draw lines of different shapes and thickness, using 2 different grades of pencil?

Dance

- Can they explore and perform basic body actions?
- Do they use different parts of the body singly and in combination?
- Do they show some sense of dynamic, expressive and rhythmic qualities in their own dance?
- Do they choose appropriate movements for different dance ideas?
- Can they remember and repeat short dance phrases and simple dances?
- Do they move with control?
- Do they vary the way they use space?
- Do they describe how their lungs and heart work when dancing?
- Do they describe basic body actions and simple expressive and dynamic qualities of movement?

Year 1: Why does it get darker earlier in winter?

KS1 Science (Y1 Seasonal Changes)

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

WOW: *Read: 'The Owl that was afraid of the dark'*	
LC1	Why are we sometimes afraid of the dark?
LC2	Where do shadows come from?
LC3	Why is the Sun so important to us and is it always in the same place?
LC4	Where do the stars go to in the daytime?
LC5	How can we create our own night picture?
LC6	Which animals come out at night?
LC7	How can we create our own shadow theatre?
LC8	Reflection: How can you create a performance of shadow puppets?

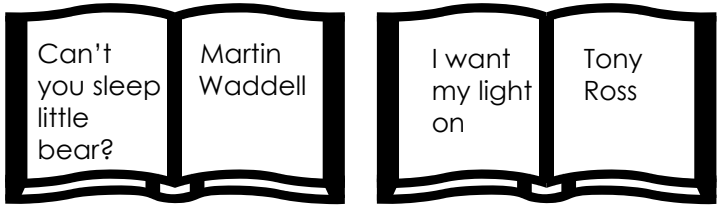
Working Scientifically: exploring shiny things and grouping them according to whether they shine in the dark or not. They can go on a shadow hunt and think about what is similar about the places where shadows are found (that is, that there is a light source and something is blocking it).

Literacy Link: Read 'The Owl that was afraid of the dark' and ask children to research animals that are nocturnal in readiness for LC6.

Numeracy Link: Opportunities to keep a record of the temperature over a night and day time and present information on a chart.
There will also be opportunities for children to measure and record the lengths of their shadows.

Creative Art Link: This LC will see children consider Van Gogh's Starry Night and they will then use his 'swirly' style to recreate their own night time pictures.

Expressive Art Link: There is an opportunity for children to write their own stories and to perform it to the Year 2 and EYFS children.



Year 1: How do the seasons impact on what we do? (on going all year)?

KS1 Science (Y1 Seasonal Changes)

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

WOW: *Someone comes into the classroom dressed as Mr/s Autumn (leaf suit). Children to prepare questions to ask him or her.*

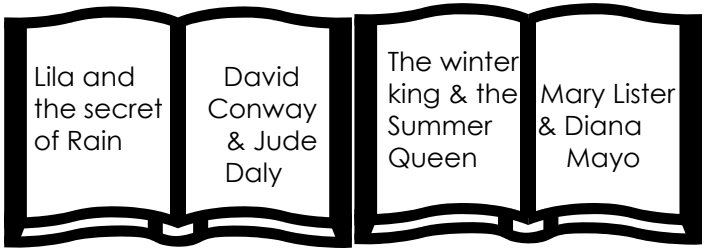
LC1	Why are there so many leaves on the ground in Autumn?
LC2	What changes do we see in our country with each season?
LC3	What would you need to do to become the next weather presenter?
LC4	How can you create patterns using leaves in the style of William Morris?
LC5	After listening to music entitled the 'Four Seasons', can you create your own music which captures different weather patterns?
LC6	Why are so many of the things you enjoy doing dependent on the time of year and the weather?
LC7	Reflection: In small groups, can you create a typical weather forecast summary which will be filmed?

Literacy Link: There are many opportunities provided for pupils to develop their oracy skills. These are especially provided within LC3 and during the reflection

Numeracy Link: Lots of opportunity to set things out in charts, especially in relation to the weather. Children will be dealing with centigrade and also measuring rainfall.

Creative Art Link: Having looked at the work of William Morris, children should be invited to create their own print and drawing based on the leaves they have found.

Expressive Art Link: There is an opportunity for children to listen to and appreciate classical music.
They will then create their own music based on different elements of weather.



Year 1: Why does it get dark early in the winter? or, Year 1: How do the seasons impact on what we do?

Year 1: Science and Art Knowledge, Skills and Understanding

Science
Working Scientifically/ Seasonal Changes

- Can they talk about what they <see, touch, smell, hear or taste>?
- Can they use simple equipment to help them make observations?
- Can they perform a simple test?
- Can they tell other people about what they have done?
- Can they record their findings using standard units?
- Can they put some information in a chart or table?

- Can they recognise that electricity is an important source of light?
- Can they identify and name the sources of light?
- Can they identify and name sources of light that we can see?
- Can they explain what darkness is?
- Can they compare sources of light? (brightest, dullest, darker, lighter)
- Can they observe and describe shadows during the day?
- Do they know that the Sun lights up the Earth?
- Can they stay safe when observing the Sun?
- Can they describe how the Sun moves across the sky?

Art & Design

- Can they create moods in their drawings?
- Can they draw using pencil and crayons?
- Can they draw lines of different shapes and thickness, using 2 different grades of pencil?
- Can they choose to use thick and thin brushes as appropriate?
- Can they name the primary and secondary colours?
- Can they describe what they can see and like in the work of another artist?
- Can they ask sensible questions about a piece of art?

Year 1 (Challenging)

- Can they use ICT to show their working?
- Can they make accurate measurements?

- Can they explain how electricity helps us at home and at school?
- Can they describe changes in <light, sound> that result from action/s?
- Can they describe how light and temperature are different during the night and day?
- Do they know that the Sun moves across the sky during the day?
- Can they explain why they can't see stars in the day time?

Year 1: Which materials should the Three Little Pigs have used to build their house?

KS1 Science (Y1: Everyday Materials)

- Distinguish between an object and the materials from which it is made;
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock;
- Describe the simple physical properties of a variety of everyday materials;
- Compare and group together a variety of everyday materials on the basis of their simple physical properties.

WOW: *Start with a discussion about the materials used by the Three Little Pigs to build each house . Visit from a builder or Bob the Builder.*

LC1	What are the advantages and disadvantages of using straw, wood and bricks for different structures?
LC2	How are bricks joined together?
LC3	How can we make very strong structures from straw?
LC4	Which materials were used to build our school and why were they chosen?
LC5	How can you build a bridge using only paper?
LC6	Can you create a dance that shows strong structures using your bodies?
LC7	Reflection: How can you design and make your ideal bedroom?

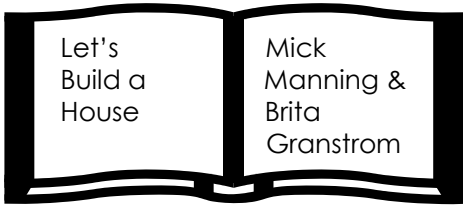
Working Scientifically: The idea here is to test each of these three materials to find out about their qualities.
They should perform simple tests to explore questions such as: 'What is the best material for ……?

Literacy Link: Link this to generally looking at Traditional Tales.

Numeracy Links: Many opportunities here for pupils to measure and to classify.

Creative Arts Link: This is an opportunity for children to work in small groups to create structures that they will have to test. Their bridges should be designed and built so as to hold 1Km in weight.

Expressive Arts Link: Create dance which shows their understanding of strength in structures. This will be performed to Year 2 and EYFS/



Year 1: What do Aliens think of life on planet Earth?

KS1 Science (Y1: Everyday Materials)

- Distinguish between an object and the materials from which it is made;
- Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock;
- Describe the simple physical properties of a variety of everyday materials;
- Compare and group together a variety of everyday materials on the basis of their simple physical properties.

WOW: *Start with a reading of 'Aliens Love Underpants'. Visit from a builder or Bob the Builder.*

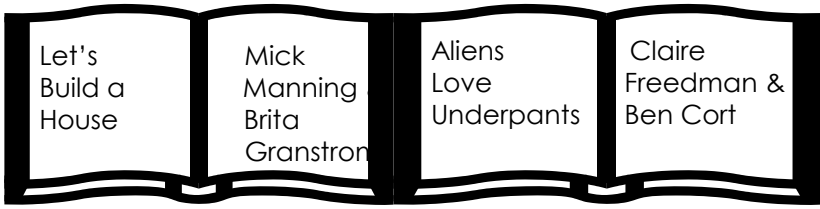
LC1	What materials can you use to make the Alien's underpants?
LC2	What material would make a good house for the aliens to live in?
LC3	Why would wood not make a good window?
LC4	How can the aliens stay safe whilst building their house?
LC5	How can the aliens stay dry in the rain and how would they go about celebrating keeping dry?
LC6	How can we make jelly for the aliens leaving party?
LC7	Reflection: Have an Alien day where the children have to dress up but do a presentation about different materials they come across as though they didn't know them before

Working Scientifically: The idea here is to test A range of materials to find out about their qualities.
They should perform simple tests to explore questions such as: 'What is the best material for ……?

Literacy Link: Link this to generally looking at Traditional Tales (though you may find a more suitable text).
Numeracy Links: Many opportunities here for pupils to measure and to classify.

Creative Arts Link: LC1 provides an opportunity for children to work in small groups to design and make underpants for the aliens.

Expressive Arts Link: Create dance which shows Alien type movements.



Year 1: Which materials should the Three Little Pigs have used to build their house? or Year 1: What do Aliens think of ;life on planet Earth?

Year 1: Science and DT Knowledge, Skills and Understanding

Science
Everyday Materials

- Can they perform a simple test?
- Can they tell other people about what they have done?
- Can they identify and classify things they observe?
- Can they think of some questions to ask?
- Can they answer some scientific questions?
- Can they give a simple reason for their answers?
- Can they explain what they have found out?
- Can they show their work using pictures, labels and captions?
- Can they record their finding using standard units?
- Can they put some information in a chart or table?

- Can they describe materials using their senses?
- Can they describe materials using their senses, using specific scientific words?
- Can they explain what material objects are made from?
- Can they explain why a material might be useful for a specific job?
- Can they name some different materials?
- Can they sort materials into groups by a given criteria?

Year 1 (Challenging)

- Can they give a simple reason for their answers?
- Can they talk about similarities and differences?
- Can they explain what they have found out using scientific vocabulary?
- Can they use ICT to show their working?
- Can they make accurate measurements?

- Can they describe things that are similar and different between materials?
- Can they explain what happens to certain materials when they are heated, eg, bread, ice, chocolate?
- Can they explain what happens to certain materials when they are cooled, eg, jelly, heated chocolate?
- Can they tell which materials are changed by bending, twisting and stretching?

Design Technology

- Can they think of some ideas of their own?
- Can they explain what they want to do?
- Can they use pictures and words to plan?
- Can they explain what they are making?
- Which tools are they using?
- Can they make a structure/model using different materials?
- Is their work tidy?
- Can they make their model stronger if it needs to be?

The Learning Challenge™ CURRICULUM

Science Learning Challenges

Year 2

Year 2 Statutory Requirements

Working Scientifically (Y1 & 2)	Living things and their habitats	Plants	Animals, including humans	Uses of everyday materials
• Ask simple questions and recognise that they can be answered in different ways; • Observe carefully, using simple equipment; • Identifying and classifying; • Using their observations and ideas to suggest answers to their questions; • Gathering and recording data to help in answering questions.	• Explore and compare differences between things that are living, dead and things that have never been alive; • Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other; • Identify and name a variety of plants and animals in their habitats, including micro-habitats; • Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	• Observe and describe how seeds and bulbs grow into mature plants; • Find out and describe how plants need water, light and suitable temperature to grow and stay healthy.	• Notice that animals, including humans, have offspring, which grow into adults; • Find out about and describe the basic needs of animals, including humans for survival (water, food and air); • Describe the importance for humans of exercise, eating the right amount of different types of food, and hygiene.	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses; • Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Science: Year 2 Overview

Key Features				
	PLANTS	**LIVING THINGS and their HABITATS**	**ANIMALS (including Humans)**	**Uses of Everyday Materials**
YEAR 2	• What plants and seeds need to grow • Growing from seeds and bulbs	• Habitats • Living and non living things • Early Food Chains	• Exercise and healthy living • What animals and humans need to survive • Animals have offspring, which grow to be adults	• Use of different everyday materials • Classifying and grouping • Changing materials by bending, etc.
Possible Learning Challenges	• **How can we grow our own salad? or** • **How can you be the next master chef?**	• **Why would a dinosaur not make a good pet?**	• **How will 5 a day help me to be healthy? or** • **How could you be the next Jessica Ennis or Steven Gerrard ?**	• **What is our school made of? or** • **Which materials did they use to build the Trafford Centre?**

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 2 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 2

Observing closely	Performing Tests	Identifying and Classifying	Recording findings
• Can they use <see, touch, smell, hear or taste> to help them answer questions? • Can they use some scientific words to describe what they have seen and measured? • Can they compare several things?	• Can they carry out a simple fair test? • Can they explain why it might not be fair to compare two things? • Can they say whether things happened as they expected? • Can they suggest how to find things out? • Can they use prompts to find things out?	• Can they organise things into groups? • Can they find simple patterns (or associations)? • Can they identify animals and plants by a specific criteria, eg, lay eggs or not; have feathers or not?	• Can they use <text, diagrams, pictures, charts, tables> to record their observations? • Can they measure using <simple equipment>?

Year 2 (Challenging)

• Can they suggest ways of finding out through listening, hearing, smelling, touching and tasting?	• Can they say whether things happened as they expected and if not why not?	• Can they suggest more than one way of grouping animals and plants and explain their reasons?	• Can they use information from books and online information to find things out?

Knowledge, Skills and Understanding breakdown for Living Things and their Habitats

Year 2

Living Things & their Habitats	Animals, including humans	Plants
• Can they match certain living things to the habitats they are found in? • Can they explain the differences between living and non-living things? • Can they describe some of the life processes common to plants and animals, including humans? • Can they decide whether something is living, dead or non-living? • Can they describe how a habitat provides for the basic needs of things living there? • Can they describe a range of different habitats? • Can they describe how plants and animals are suited to their habitat?	• Can they describe what animals need to survive? • Can they explain that animals grow and reproduce? • Can they explain why animals have offspring which grow into adults? • Can they describe the life cycle of some living things? (e.g. egg, chick, chicken) • Can they explain the basic needs of animals, including humans for survival? (water, food, air) • Can they describe why exercise, balanced diet and hygiene are important for humans?	• Can they describe what plants need to survive? • Can they observe and describe how seeds and bulbs grow into mature plants? • Can they find out & describe how plants need water, light and a suitable temperature to grow and stay healthy?

Year 2 (Challenging)

• Can they name some characteristics of an animal that help it to live in a particular habitat? • Can they describe what animals need to survive and link this to their habitats?	• Can they explain that animals reproduce in different ways?	• Can they describe what plants need to survive and link it to where they are found? • Can they explain that plants grow and reproduce in different ways?

Knowledge, Skills and Understanding breakdown for Uses of Everyday Materials

Year 2

Classifying and grouping materials	Changing materials
• Can they describe the simple physical properties of a variety of everyday materials? • Can they compare and group together a variety of materials based on their simple physical properties?	• Can they explore how the shapes of solid objects can be changed? (squashing, bending, twisting, stretching) • Can they find out about people who developed useful new materials? (John Dunlop, Charles Macintosh, John McAdam) • Can they identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper, cardboard for particular uses? • Can they explain how things move on different surfaces?

Year 2 (Challenging)

• Can they describe the properties of different materials using words like, transparent or opaque, flexible, etc.? • Can they sort materials into groups and say why they have sorted them in that way? • Can they say which materials are natural and which are man made?	• Can they explain how materials are changed by heating and cooling? • Can they explain how materials are changed by bending, twisting and stretching? • Can they tell which materials cannot be changed back after being heated, cooled, bent, stretched or twisted?

Year 2: How can we grow our own salad?

KS1 Science (Y2 Plants)

- Observe and describe how seeds and bulbs grow into mature plants;
- Find out and describe how plants need water, light and suitable temperature to grow and stay healthy.

WOW: *Visit from a scarecrow to explain about his job and to talk about pests*

LC1	Who's afraid of the big bad scarecrow?
LC2	What makes up a salad and why should we be eating salad regularly?
LC3	What do we need to remember if our plants are to grow ?
LC4	Why are earthworms really helpful creatures?
LC5	Who is Arcimboldo and what can we learn from him?
LC6	What goes on at a garden centre?
LC7	Guess who's coming for dinner?
LC8	Reflection: Can you make a sandwich filled with the salad you have grown?

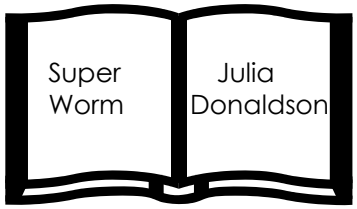
Working Scientifically: Making sure that children work out what a 'fair test' is. Observing and recording, with some accuracy, the growth of a variety of plants as they change over time from a seed or bulb, or observing similar plants at different stages of growth; setting up a comparative test to show that plants need light and water to stay healthy.

Literacy Link: LC1: Children to think of the questions they would ask a scarecrow. Research about the items that make up our salad, ie, tomatoes, lettuce, etc.

Link to animals: LC4: Set up a wormery.

Creative Art Link: This LC will see children re-create the style of work made famous by Arcimboldo and use fruits and vegetables to create their own montage.

Literacy Link: Children will prepare a meal and invite someone special. This will involve writing an invitation and setting up tables to ensure that their guest is well cared for.



Year 2: How can you be the next master chef?

KS1 Science (Y2 Plants)

- Observe and describe how seeds and bulbs grow into mature plants;
- Find out and describe how plants need water, light and suitable temperature to grow and stay healthy.

WOW: *Visit from a local chef (eg, Desi Grill) to explain about his job and to demonstrate making a dish.*

LC1	What does a chef do?
LC2	Where do chefs get their ingredients from?
LC3	How can we grow our own ingredients?
LC4	Why are earthworms really helpful creatures?
LC5	Who is Arcimboldo and what can we learn from him?
LC6	What would my special meal look like?
LC7	Guess who's coming for dinner?
LC8	Reflection: Can you make a sandwich filled with the salad you have grown?

Literacy Link: Children to think of the questions they would ask a chef.
Research about the items that make up the ingredients the chef used, ie, chickpeas, rice, lettuce, etc.
Write an invitation to their special guest (LC7)

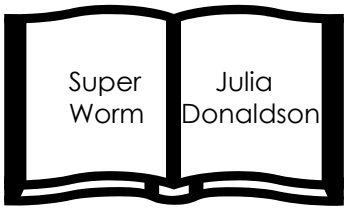
Working Scientifically: Making sure that children work out what a 'fair test' is.

Link to animals: Set up a wormery.

Creative Art Link: This LC will see children re-create the style of work made famous by Arcimboldo and use fruits and vegetables to create their own montage.

Literacy Link: Children will prepare a meal and invite someone special. This will involve writing an invitation and setting up tables to ensure that their guest is well cared for.

Creative link: Food technology. Children will design and make a meal they will serve to a guest they have invited.



Year 2: How can we grow our own salad? or How can you be the next master chef?

Year 2: Science and Art Knowledge, Skills and Understanding

Science
Plants

- Can they use some scientific words to describe what they have seen and measured?
- Can they compare several things?
- Can they carry out a simple fair test?
- Can they explain why it might not be fair to compare two things?
- Can they say whether things happened as they expected?
- Can they suggest how to find things out?
- Can they use prompts to find things out?
- Can they organise things into groups?
- Can they use (text, diagrams, pictures, charts, tables)to record their observations?
- Can they measure using <simple equipment>?

- Can they describe some of the life processes common to plants and animals, including humans?
- Can they describe what plants need to survive?
- Can they describe how seeds and bulbs grow into plants?
- Can they describe what a plant needs to grow and stay healthy?
- Can they explain that plants grow and reproduce?
- Can they compare how plants grow in different conditions by making measurements?

Year 2 (Challenging)

- Can they say whether things happened as they expected and if not why not?
- Can they use information from books and online information to find things out?

- Can they describe what plants need to survive and link it to where they are found?
- Can they explain that plants grow and reproduce in different ways?

Art & Design

- Can they create individual and group collages?
- Can they use different kinds of materials on their collage and explain why they have chosen them?
- Can they use repeated patterns in their collage?
- Can they say how other artists have used colour, pattern and shape?
- Can they create a piece of work in response to another artist's work?
- Can they begin to demonstrate their ideas through photographs and in their sketch books?
- Can they set out their ideas, using 'annotation' in their sketch book?
- Do they keep notes in their sketch books as to how they have changed their work?

Year 2: Why would a dinosaur not make a good pet?

KS1 Science (Y2 Living Things and their Habitats)

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

WOW: *Children find a very large egg in the class and they have to find out where it has come from and whose egg it is.*

LC1	Who does this egg belong to?
LC2	What does a dinosaur need to survive?
LC3	What can you find out about a particular dinosaur?
LC4	How can you re-create your own dinosaur land?
LC5	How can you classify dinosaurs?
LC6	How can we recreate the sound and movements of the dinosaurs?
LC7	How do you know that dinosaurs really roamed the Earth?
LC8	Reflection: How can you produce a TV programme about dinosaurs?

Working Scientifically: sorting and classifying things according to whether they are living, dead or were never alive, and recording their findings using charts.

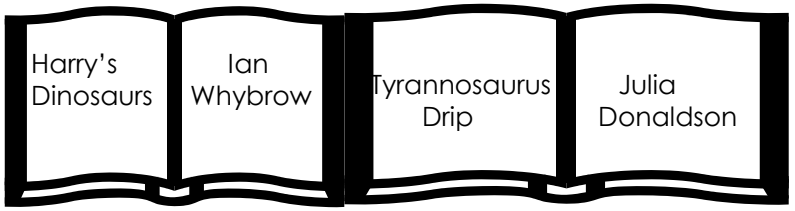
Literacy Link: Research into which animals lay eggs and which do not. In addition they would need to find out about the sizes of the eggs, etc.
They will then create fact-files about specific dinosaurs.

Numeracy Link: Opportunities through the classification of dinosaurs to tally and make tables and graphs.

Habitats Link: This LC is about working out what their own pets need to survive. They will then consider what dinosaurs would have needed and recognise the key components that are required for animals to live and flourish.

Creative Art Link: This LC will see children re-create a dinosaur land. It will involve several DT skills as children plan, design, create and evaluate their models.

Expressive Art Link: Children will try and simulate the sounds that would have been heard in a land where dinosaurs roamed. They will use a range of instruments to create the sounds and then aim to have the sounds linked to the dinosaur land models they have created. These will then feature as part of their reflection.



Year 2: Why would a dinosaur not make a good pet?

Year 2: Science, DT and Music Knowledge, Skills and Understanding

Science
Animals, All Living Things and their Habitats

- Can they match certain living things to the habitats they are found in?
- Can they explain the differences between living and non-living things?
- Can they describe some of the life processes common to plants and animals, including humans?
- Can they decide whether something is living, dead or non-living?
- Can they describe how a habitat provides for the basic needs of things living there?
- Can they describe what animals need to survive?
- Can they describe the life cycle of some living things? (e.g. egg, chick, chicken)
- Can they describe a range of different habitats?
- Can they describe how plants and animals are suited to their habitat?

Music

- Can they order sounds to create a beginning, middle and end?
- Can they create music in response to <different starting points>?
- Can they choose sounds which create an effect?
- Can they use symbols to represent sounds?
- Can they improve their own work?

Year 2 (Challenging)

- Can they name some characteristics of an animal that help it to live in a particular habitat?
- Can they describe what animals need to survive and link this to their habitats?
- Can they explain that animals reproduce in different ways?

DT

- Can they make sensible choices as to which material to use for their constructions?
- Can they develop their own ideas from initial starting points?
- Can they consider how to improve their construction?

Year 2: How will 5 a day help me to be healthy?

KS1 Science (Y2 Animals, including humans)

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

WOW: *Remind children of the book 'Handa's Surprise' and have a bowl of exotic fruits from all over the world to talk about*

LC1	Why is it important for you to grow? What can you now do that you couldn't 5 years ago?
LC2	What is my Sports X Factor?
LC3	Why would it not be sensible for me to eat sweets everyday?
LC4	Which fruits grow naturally in our country?
LC5	Which fruits provide good opportunities for print work?
LC6	Where would we most likely find bananas, oranges and grapes growing?
LC7	Reflection: Can you make up a TV advert to convince children to eat more fruit?

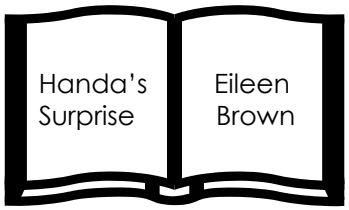
Working Scientifically: Children to conduct a survey to see how many children eat at least one piece of fruit each day and which is the most popular fruit. Observing, asking questions about what humans need to stay healthy

Literacy Link: Children to remind themselves of the book – 'Handa's Surprise' and then create an information text on one of the exotic fruits to be looked at.

Expressive Art Link: This LC will see children show their sporting prowess and be encouraged to perform in front of others. We anticipate gymnastics movements; dance; keepie ups, etc.

Geographical Link: Children will carry out research to find out which fruits grow where and set these out on a map.

Creative Arts Link: Opportunity here to link to the work of William Morris and to create their own unique print starting with a fruit or vegetable.



Year 2: How could you be the next Jessica Ennis or Steven Gerrard? (use local role models)

KS1 Science (Y2 Animals, including humans)

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

WOW: *Show extracts of Jessica Ennis and Steven Gerrard in action and ask children to talk about their special skills.*

LC1	What do Jennifer and Steven do to keep healthy?
LC2	What are Jessica and Steven especially good at and what is your Sports X Factor?
LC3	Why would it not be sensible for Jessica or Steven to eat sweets everyday?
LC4	Which fruits grow naturally in our country?
LC5	Which fruits provide good opportunities for print work?
LC6	Where would we most likely find bananas, oranges and grapes growing?
LC7	Reflection: Can you make up a TV advert to convince children to eat more healthily?

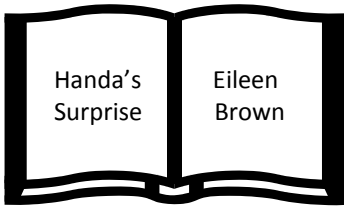
Working Scientifically: Children to conduct a survey to see how many children eat at least one piece of fruit each day and which is the most popular fruit. Observing, asking questions about what humans need to stay healthy

Literacy Link: Children to remind themselves of the book – 'Handa's Surprise' and then create an information text on one of the exotic fruits to be looked at.

Expressive Art Link: This LC3 will see children show their sporting prowess and be encouraged to perform in front of others. We anticipate gymnastics movements; dance; keepie ups, etc.

Geographical Link: Children will carry out research to find out which fruits grow where and set these out on a map.

Creative Arts Link: Opportunity here to link to the work of William Morris and to create their own unique print starting with a fruit or vegetable.



Year 2: How will 5 a day help me to be healthy? or How could you be the next Jessica Ennis or Steven Gerrard?

Year 2: Science, Dance and Art Knowledge, Skills and Understanding

Science
Animals including Humans

- Can they describe what animals need to survive?
- Can they explain that animals grow and reproduce?
- Can they describe the life cycle of some living things? (e.g. egg, chick, chicken)
- Can they explain the basic needs of animals, including humans?
- Can they describe why exercise, a balanced diet and hygiene is important for humans?
- Can they collect weather data about a local habitat and use it to explain the plants and animals they will find there?
- Can they explain how animals get their food and draw a simple food chain?

Art & Design

- Can they create a print using pressing, rolling, rubbing and stamping?
- Can they create a print like a designer?
- Can they mix paint to create all the secondary colours?
- Can they mix and match colours, predicting outcomes?
- Can they mix their own brown?
- Can they make tints by adding white?
- Can they make tones by adding black?
- Can they use different kinds of materials on their collage and explain why they have chosen them?
- Can they use repeated patterns in their collage?

Year 2 (Challenging)

- Can they classify living things into groups according to a range of criteria they have been given?

Dance

- Can they perform body actions with control and co-ordination?
- Can they choose movements with different dynamic qualities to make a dance phrase that expresses an idea, mood or feeling?
- Can they remember and repeat dance phrases?
- Can they perform short dances, showing an understanding of expressive qualities?
- Can they describe the mood, feelings and expressive qualities of dance?
- Can they describe how dancing affects their body?
- Do they know why it is important to be active?
- Can they suggest ways they could improve their work?

Year 2: What is your school made of?

KS1 Science (Y2 Uses of Everyday Materials)

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses;
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

WOW: *Collect together a range of objects and use them to talk about what they are made of.*

LC1	How can you classify your toys taking account of the materials they are made of?
LC2	What are the main reasons for choosing materials for different parts of the school?
LC3	What else can you find that is made of: metal; glass; plastic and wood?
LC4	Can you think of the advantages and disadvantages of some common materials?
LC5	Can you make a toy using a range of materials and explain why you have chosen the materials?
LC6	How are different materials used for different musical instruments?
LC7	Reflection: Each group will take a different material and give a presentation about their chosen material.

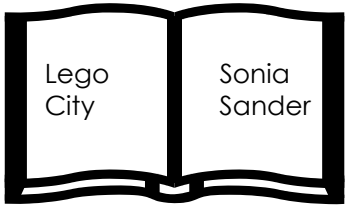
Working Scientifically: comparing the uses of everyday materials in and around the school with materials found in other places (at home, on the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Literacy Link: Children to make lists of advantages and disadvantages of different materials. They will also write descriptions of different materials.

Numeracy Link: Children to organise their classifications to take account of different sets, etc.

Creative Arts Link: Children will design, plan and make a toy and then evaluate its effectiveness.

Expressive Arts Link: Children will give careful consideration to the sound made by musical instruments made from different materials.



Year 2: Which materials did they use to build the Trafford Centre? (use any large building close to your school)

KS1 Science (Y2 Materials)

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, rock, brick, paper and cardboard for particular uses;
- Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

WOW: *Take a visit to the Trafford Centre and note the materials that have been used to build it.*

LC1	What is our school built of?
LC2	What are the main differences between our school and the Trafford Centre?
LC3	Can you make a list of all the different materials you saw at the Trafford Centre and explain why they have been used?
LC4	Can you design an outdoor play-area for the Trafford Centre?
LC5	Can you design and make a building (for a specific reason) using a range of materials and explain why you have chosen the materials?
LC6	How are different materials used for different musical instruments?
LC7	Reflection: Each group will take a different material and give a presentation about their chosen material.

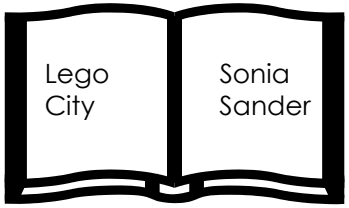
Working Scientifically: comparing the uses of everyday materials in and around the Trafford Centre and school with materials found in other places (at home, on the journey to school, on visits, and in stories, rhymes and songs); observing closely, identifying and classifying the uses of different materials, and recording their observations.

Literacy Link: Children to make lists of advantages and disadvantages of different materials. They will also write descriptions of different materials.

Numeracy Link: Children to organise their classifications to take account of different sets, etc.

Creative Arts Link: Children will design, plan and make a building and then evaluate its effectiveness.

Expressive Arts Link: Children will give careful consideration to the sound made by musical instruments made from different materials.



Year 2: What is your school made of? or Which materials did they use to build the Trafford Centre?

Year 2: Science, DT and Music Knowledge, Skills and Understanding

Science: Materials

- Can they distinguish between an object and the material from which it is made?
- Can they identify and name a range of everyday materials? (wood, plastic, metal, water, rock, brick, paper, glass)
- Can they describe the simple physical properties of a variety of everyday materials?
- Can they compare and classify a variety of materials based on their simple physical properties?

Design Technology

- Can they think of ideas and plan what to do next?
- Can they choose the best tools and materials? Can they give a reason why these are best?
- Can they describe their design by using pictures, diagrams, models and words?
- Can they join things (materials/ components) together in different ways?
- What went well with their work?
- If they did it again, what would they want to improve?
- Can they measure materials to use in a model or structure?
- Can they join materials in different ways?
- Can they use joining, folding or rolling to make it stronger?

Year 2 (Challenging)

- Can they describe the properties of different materials using words like, transparent or opaque, flexible, etc.?
- Can they sort materials into groups and say why they have sorted them in that way?
- Can they say which materials are natural and which are man made?

Music

- Can they respond to different moods in music?
- Can they say how a piece of music makes them feel?
- Can they say whether they like or dislike a piece of music?
- Can they choose sounds to represent different things?
- Can they recognise repeated patterns?

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 2 Science

(non Statutory)

Year 2: Where did that racket come from?

KS1 Science (Y2 Sound)

- observe and name a variety of sources of sound, noticing that we hear with our ears
- recognise that sounds get fainter as the distance from the sound source increases.

WOW: *Create a soundless environment and get children to write down their observations*

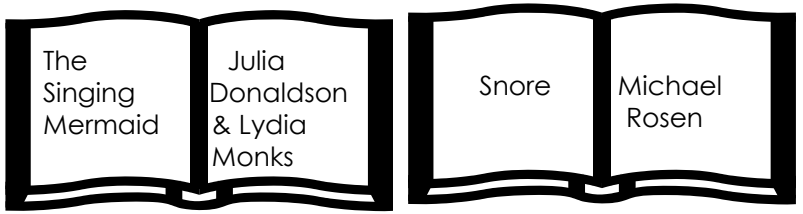
LC1	How important are our ears and how loud is your shout?
LC2	In how many ways do we depend on sound in our everyday life?
LC3	Can you write your own audio book using 'talking tins'?
LC4	How can you design and make a musical instrument that can be played by others?
LC5	How can you make a simple telephone?
LC6	Which instrument was used to make that piece of music?
LC7	Reflection: Children to set up a music competition for Year 3 in which they have to guess which instrument/s was used for each piece of music.

Working Scientifically: Children will compare different sound sources and look for patterns; carrying out tests to find the best places to locate fire bells in school.
During LC1 children will experiment with Chinese whispers and with covering ears with mufflers.

Numeracy Link: During LC1 children will be required to measure distances at which they can hear and cannot hear a partner shout. Children during LC 6 can create data based on the likes and dislikes of children's preferences for different types of music. During LC5 children will measure distances when trying out their own telephones

Creative Art Link: This LC will see children design and make their own musical instrument to a given specification.

Expressive Arts: This LC is an opportunity for children to listen to and appreciate a range of music from different genres and think about the instruments used.



Year 2: Could you be the next Lightning McQueen?

KS1 Science (Y2 Forces and Movement)

- describe how things move at different speeds, speed up and slow down, using simple comparisons, comparative vocabulary and superlative vocabulary.

WOW: *Children invited to bring in scooters, skateboards or roller blades to consider most appropriate for each occasion*

LC1	Why were we not born with wheels?
LC2	Why does a wheel or a ball help us to move faster?
LC3	How can you create a model that will move on its own?
LC4	What can you find out about different ways that people travel?
LC5	How can you take the song 'The wheels on the bus' and turn into a rap using your new knowledge?
LC6	Reflection: Can you put together an ICT presentation of the work you have done on making things go faster and slower?

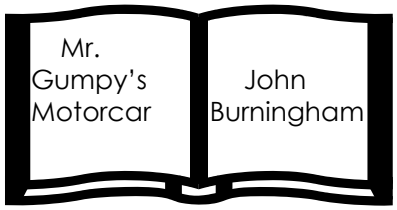
Working Scientifically: Children to bring in a range of wheeled toys which can move and check which are most effective and efficient in different situations.

Numeracy Link: Children to create time trials for the wheeled structures and time them to see which is best suited for each task. Create a straight run; a slalom; different terrain, etc.

Creative Art Link: This LC will see children create their own vehicles and then test them to see what will help them move more quickly.

Literacy Link: Children will carry out research on different modes of transport starting with asking a range of questions which they will then research.

Expressive Arts: This LC is linked to performing a piece of music and adapting it to the new knowledge they now have.



Science
Lower Key Stage 2

Lower Key Stage 2

Science Programme of Study: Lower Key Stage 2

- The principal focus of science teaching in **lower key stage 2** is to enable pupils to broaden their scientific view of the world around them. They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions. They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information. They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.

- 'Working scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.

- Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

The Learning Challenge™ CURRICULUM

Science Learning Challenges

Year 3

Year 3 Statutory Requirements

Working Scientifically (Y3 & Y4)	Plants	Animals, including humans
• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	• identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers • explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant • investigate the way in which water is transported within plants • explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	• identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat • identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Year 3 Statutory Requirements (continued)

Rocks	Light	Forces and Magnets
• compare and group together different kinds of rocks on the basis of their appearance and simple physical properties • describe in simple terms how fossils are formed when things that have lived are trapped within rock • recognise that soils are made from rocks and organic matter.	• recognise that they need light in order to see things and that dark is the absence of light • notice that light is reflected from surfaces • recognise that light from the sun can be dangerous and that there are ways to protect their eyes • recognise that shadows are formed when the light from a light source is blocked by a solid object • find patterns in the way that the size of shadows change.	• compare how things move on different surfaces • notice that some forces need contact between two objects, but magnetic forces can act at a distance • observe how magnets attract or repel each other and attract some materials and not others • compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials • describe magnets as having two poles • predict whether two magnets will attract or repel each other, depending on which poles are facing.

Science: Year 3 Overview

	ANIMALS (including Humans)	PLANTS	LIGHT	FORCES and MAGNETS	ROCKS
YEAR 3	• Nutrition, linked to what we eat • Skeletons and muscles	• Function of different parts of plants • What different plants need to flourish • Journey of water through a plant • Life cycle of a plant	• Sources, including the Sun • Protecting eyes from the Sun • Shadows • Reflection /mirrors	• How magnets attract/repel some materials • Magnetic poles • Friction	• How rocks are formed • Different kinds of rocks • Fossils • Soil
Possible Learning Challenges	• **How can Usain Bolt move so quickly?**	• **How did that blossom become an apple?**	• **How far can you throw your shadow?**	• **Are you attractive enough?**	• **What do rocks tell us about the way the Earth was formed?**

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 3 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 3

Planning	Obtaining and presenting evidence	Considering evidence and evaluating
• Can they use different ideas and suggest how to find something out? • Can they make and record a prediction before testing? • Can they plan a fair test and explain why it was fair? • Can they set up a simple fair test to make comparisons? • Can they explain why they need to collect information to answer a question?	• Can they measure using different equipment and units of measure? • Can they record their observations in different ways? <labelled diagrams, charts etc> • Can they describe what they have found using scientific language? • Can they make accurate measurements using standard units?	• Can they explain what they have found out and use their measurements to say whether it helps to answer their question? • Can they use a range of equipment (including a data-logger) in a simple test?

Year 3 (Challenging)

• Can they record and present what they have found using scientific language, drawings, labelled diagrams, bar charts and tables?	• Can they explain their findings in different ways (display, presentation, writing)? • Can they use their findings to draw a simple conclusion? • Can they suggest improvements and predictions for further tests?	• Can they suggest how to improve their work if they did it again?

Knowledge, Skills and Understanding breakdown for Plants and Animals, including Humans

Year 3

Animals, including humans	Plants
• Can they explain the importance of a nutritionally balanced diet? • Can they describe how nutrients, water and oxygen are transported within animals and humans? • Can they identify that animals, including humans, cannot make their own food: they get nutrition from what they eat? • Can they describe and explain the skeletal system of a human? • Can they describe and explain the muscular system of a human?	• Can they identify and describe the functions of different parts of flowering plants? (roots, stem/trunk, leaves and flowers)? • Can they explore the requirement of plants for life and growth (air, light, water, nutrients from soil, and room to grow)? • Can they explain how they vary from plant to plant? • Can they investigate the way in which water is transported within plants? • Can they explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal?

Year 3 (Challenging)

• Can they explain how the muscular and skeletal systems work together to create movement? • Can they classify living things and non-living things by a number of characteristics that they have thought of? • Can they explain how people, weather and the environment can affect living things? • Can they explain how certain living things depend on one another to survive?	• Can they classify a range of common plants according to many criteria (environment found, size, climate required, etc.)?

Knowledge, Skills and Understanding breakdown for Rocks

Year 3

Rocks

- Can they compare and group together different rocks on the basis of their appearance and simple physical properties?
- Can they describe and explain how different rocks can be useful to us?
- Can they describe and explain the differences between sedimentary and igneous rocks, considering the way they are formed?
- Can they describe in simple terms how fossils are formed when things that have lived are trapped within rock?
- Can they recognise that soils are made from rocks and organic matter?

Year 3 (Challenging)

- Can they classify igneous and sedimentary rocks?
- Can they begin to relate the properties of rocks with their uses?

Knowledge, Skills and Understanding breakdown for Light, Forces and Magnets

Year 3

Forces and magnets	Light
• Can they compare how things move on different surfaces? • Can they observe that magnetic forces can be transmitted without direct contact? • Can they observe how some magnets attract or repel each other? • Can they classify which materials are attracted to magnets and which are not? • Can they notice that some forces need contact between two objects, but magnetic forces can act at a distance? • Can they compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet? • Can they identify some magnetic materials? • Can they describe magnets have having two poles (N & S)? • Can they predict whether two magnets will attract or repel each other depending on which poles are facing?	• Can they recognise that they need light in order to see things? • Can they recognise that dark is the absence of light? • Can they notice that light is reflected from surfaces? • Can they recognise that light from the sun can be dangerous and that there are ways to protect their eyes? • Can they recognise that shadows are formed when the light from a light source is blocked by a solid object? • Can they find patterns in the way that the size of shadows change?

Year 3 (Challenging)

• Can they investigate the strengths of different magnets and find fair ways to compare them?	• Can they explain why lights need to be bright or dimmer according to need? • Can they explain the difference between transparent, translucent and opaque? • Can they explain why lights need to be bright or dimmer according to need? • Can they make a bulb go on and off? • Can they say what happens to the electricity when more batteries are added? • Can they explain why their shadow changes when the light source is moved closer or further from the object?

Year 3: How can Usain Bolt move so quickly?

KS2 Science (Y3 Animals, including humans)

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

WOW: *Check to see how far each child can run in the 9.68 secs which is the world record for 100m. Compare with Usain Bolt.*

LC1	How long will it take you to run 100m?
LC2	How does the arm joint work and can you make a similar joint?
LC3	What role does the muscle have in helping the arm to move?
LC4	How does the food we eat get transported around our body?
LC5	Can you sketch the position that Usain Bolt is in from 'on your marks to go'?
LC6	How can you create a movement that links six different balances, using your body?
LC7	Reflection: From photographs of your balances explain how the skeleton and muscles link to support you.

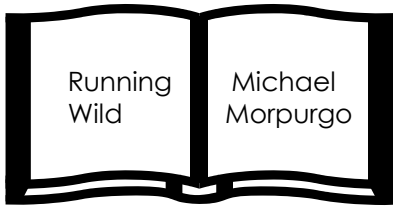
Working Scientifically: Identifying and grouping animals with and without skeletons and observing and comparing their movement; exploring ideas about what would happen if humans did not have skeletons.

Numeracy Link: Children to time themselves running and then create graphs to make comparisons with Usain Bolt's time.

Literacy Link: Children to work on explanation texts and explain how the food is transported by the blood to the various muscles in the body.

Creative Arts Link: Create different sketches of the position of a body as it moves from crouch to upright when running. Think of proportions. Think of Giacometti; Thomas Heatherwick (b of the bang)

Expressive Arts Link: Create dance movements, from ballet to street dance, which reflect the body's ability to balance and move between different positions.



Year 3: How can Usain Bolt move so quickly?

Year 3: Science and Art Knowledge, Skills and Understanding

Science
Animals, including Humans

- Can they make and record a prediction before testing?
- Can they measure using different equipment and units of measure?
- Can they record their observations in different ways? (labelled diagrams, charts etc.)
- Can they describe what they have found using scientific words?
- Can they make accurate measurements using standard units?
- Can they explain what they have found out and use their measurements to say whether it helps to answer their question?

- Can they explain the importance of a nutritious balanced diet?
- Can they describe how nutrients, water and oxygen are transported within animals and humans?
- Can they describe and explain the skeletal system of a human?
- Can they describe and explain the muscular system of a human?

Year 3 (Challenging)

- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts, keys and tables?
- Can they explain their findings in different ways (display, presentation, writing)?
- Can they use their findings to draw a simple conclusion?

- Can they explain how the muscular and skeletal systems work together to create movement?

Art & Design

- Can they use their sketches to produce a final piece of work?
- Can they write an explanation of their sketch in notes?
- Can they use different grades of pencil shade, show different tones, show tone and texture?
- Can they make notes in their sketch book about techniques used by artists?
- Can they suggest improvements to their work by keeping notes in their sketch books?
- Can they show proportion when drawing the face or the whole body?

Year 3: How did that blossom become an apple?

KS2 Science (Y3 Plants) – (May or June)

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

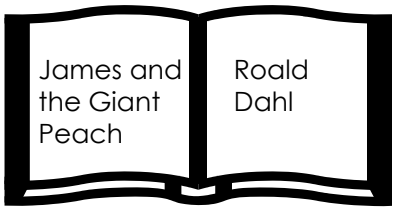
WOW: *Start by making a fruit salad and discuss the fruit used*	
LC1	What is blossom and why is it so important for the fruit we grow?
LC2	How can you make a presentation to show the life cycle of an apple?
LC3	Could we grow any fruit in this country? If not why not?
LC4	How can you capture the beauty of the blossom?
LC5	What happens to the water that you put into the soil to help a plant grow?
LC6	What do we mean by seed dispersal and why is it so important for our plants?
LC7	Why is it so important for us to look after the bees in our country?
LC8	Reflection: Choose one of these areas and perform a presentation to the rest of the class: Why are bees important to us?; Where did that apple come from?; What is seed dispersal?

Working Scientifically: Children will be provided with many opportunities to carry out their own research based on different aspects of plants they will have looked at.
Comparing the effect of different factors on plant growth, for example, the amount of light, the amount of fertiliser; discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed.

Creative Art Link: Children to create their own fruit salads taking account of food hygiene and design procedures

Literacy Link: Children to write information texts on a range of aspects such as, pollination, seed dispersal, the life cycle of an apple, etc.

Creative Art Link: Children to use water colours to create paintings of different blossom working from first hand experience.



Year 3: How did that blossom become an apple?

Year 3: Science, Art and DT Knowledge, Skills and Understanding

Science - Plants

- Can they record their observations in different ways? (labelled diagrams, charts etc.)
- Can they describe what they have found using scientific words?

- Can they identify and describe the functions of different parts of plants? (roots, stem, leaves and flowers)
- Can they identify what a plants needs for life and growth?
- Can they describe the ways in which nutrients, water and oxygen are transported within plants?
- Can they explain how the needs and functions of plant parts vary from plant to plant e.g. insect and wind pollinated plants?
- Can they investigate the way in which water is transported within plants?

Year 3 (Challenging)

- Can they explain their findings in different ways (display, presentation, writing)?
- Can they use their findings to draw a simple conclusion?
- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts, keys and tables?

- Can they classify a range of common plants according to many criteria (environment found, size, climate required, etc.)?
- Can they explore the role of flowers in the life cycle of flowering plants. Including pollination, seed formation and seed dispersal?

Art & Design

- Can they predict with accuracy the colours that they mix?
- Do they know where each of the primary and secondary colours sits on the colour wheel?
- Can they create a background using a wash?
- Can they use a range of brushes to create different effects?
- Can they use their sketch books to express feelings about a subject and to describe likes and dislikes?
- Can they make notes in their sketch book about techniques used by artists?
- Can they suggest improvements to their work by keeping notes in their sketch books?
- Can they explore work from other periods of time?
- Are they beginning to understand the viewpoints of others by looking at images of people and understand how they are feeling and what the artist is trying to express in their work?

Design Technology

- Can they show that their design meets a range of requirements?
- Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?
- Can they describe their design using an accurately labelled sketch and words?
- How realistic is their plan?
- Can they use equipment and tools accurately?
- What did they change which made their design even better?

Year 3: How far can you throw your shadow?

KS2 Science (Y3 Light)

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

WOW: *Use torches to create different shapes and attempt to photograph them.*

LC1	How can you show that your shadow changes according to the position of the Sun?
LC2	Why do footballers in a night match often have four shadows?
LC3	How can you explain the relationship between the Sun and the Moon (in terms of lighting up the moon)?
LC4	How can you design and make a periscope to show how light reflects?
LC5	How can you set up an experiment to show how shiny things respond in the dark?
LC6	Can you create a painting which shows reflection of light on water?
LC7	Can you create a stained glass window which is translucent?
LC8	Reflection: Put together a photo story of the completed challenge.

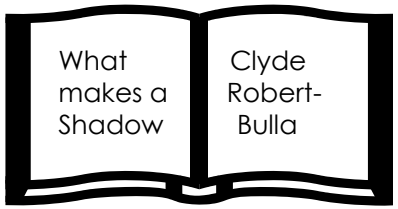
Working Scientifically: Set up a fair test to see what happens when there is more than one source of light and record findings.
Looking for patterns in what happens to shadows when the light source moves or the distance between the light source and the object changes.

Numeracy Link: Children to measure the lengths of their shadows and to present their findings in graphical format

Creative Art Link: Children to design and make periscopes, taking account of the light source

Creative Arts Link: Children to look at the work of Turner and use water colour or acrylic paint to create the reflection on water.

Creative Arts Link: Children to design and create their own stained glass windows having thought about their design.



Year 3: How far can you throw your shadow?

Year 3: Science, Art and DT Knowledge, Skills and Understanding

Science - Light

- Can they make and record a prediction before testing?
- Can they measure using different equipment and units of measure?
- Can they record their observations in different ways? (labelled diagrams, charts etc.)
- Can they describe what they have found using scientific words?
- Can they make accurate measurements using standard units?
- Can they explain what they have found out and use their measurements to say whether it helps to answer their question?
- Can they explain what dark is using words like shadow?

Year 3 (Challenging)

- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts, keys and tables?
- Can they explain their findings in different ways (display, presentation, writing)?
- Can they use their findings to draw a simple conclusion?

- Can they explain why lights need to bright or dimmer according to need?
- Can they explain why their shadow changes when the light source is moved closer or further from the object?

Art & Design

- Can they predict with accuracy the colours that they mix?
- Do they know where each of the primary and secondary colours sits on the colour wheel?
- Can they create a background using a wash?
- Can they use a range of brushes to create different effects?
- Can they use their sketch books to express feelings about a subject and to describe likes and dislikes?
- Can they make notes in their sketch book about techniques used by artists?
- Can they suggest improvements to their work by keeping notes in their sketch books?
- Can they explore work from other periods of time?
- Are they beginning to understand the viewpoints of others by looking at images, people and understand how they are feeling and what the artist is trying to express in their work?

Design Technology

- Can they show that their design meets a range of requirements?
- Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?
- Can they describe their design using an accurately labelled sketch and words?
- How realistic is their plan?
- Can they use equipment and tools accurately?
- What did they change which made their design even better?

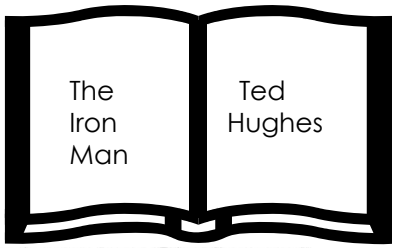
Year 3: Are you attractive enough?

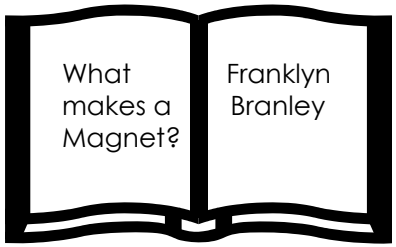
KS2 Science (Y3 Forces and Magnets)

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

WOW: *Explore with a number of magnets and work out which side attracts and which side repels*

LC1	What is a magnet and what is its relationship to the North Pole?
LC2	What do we mean by attract and repel?
LC3	What other force do we know about and how can we classify forces?
LC4	How can we use magnets to make an exciting game?
LC5	Reflection: Create a television advert for your magnetic game





Working Scientifically: Children will set up a fair test to consider what is attracted by magnets and what is repelled by magnets. Exploring the strengths of different magnets and finding a fair way to compare them; sorting materials into those that are magnetic and those that are not; looking for patterns in the way that magnets behave in relation to each other and what might affect this, such as the strength of the magnet or which pole faces another; identifying how these properties make magnets useful in everyday items and suggesting creative uses for different magnets.

Literacy Link: Children to create tables of classifications in list format

Literacy Link: Children to focus on persuasive skills to make their game attractive to others.

Creative Art Link: Children to plan, design and make a simple game based on magnets.

The Learning Challenge™ CURRICULUM

Year 3: Are you attractive enough?

Year 3: Science and DT Knowledge, Skills and Understanding

Science – Forces and Magnets

- Can they use different ideas and suggest how to find something out?
- Can they make and record a prediction before testing?
- Can they plan a fair test and explain why it was fair?
- Can you set up a simple fair test to make comparisons?
- Can they explain why they need to collect information to answer a question?

- Can they observe that magnetic forces can be transmitted without direct contact?
- Can they talk about how some magnets attract or repel each other?
- Can they classify which materials are attracted to magnets?
- Can they describe the speed and direction of moving objects?

Year 3 (Challenging)

- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts, keys and tables?

- Can they investigate the strengths of different magnets and find fair ways to compare them?
- Can they explain why an object will move faster if it is rolling down a hill or a slope?

Design Technology

- Do they select the most appropriate tools and techniques to use for a given task?
- Can they show that their design meets a range of requirements?
- Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?
- Can they describe their design using an accurately labelled sketch and words?
- How realistic is their plan?
- Can they use equipment and tools accurately?
- What did they change which made their design even better?

Year 3: What do rocks tell us about the way the Earth was formed? (Linked to 'What makes the Earth Angry?')

KS2 Science (Y3 Rocks)

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

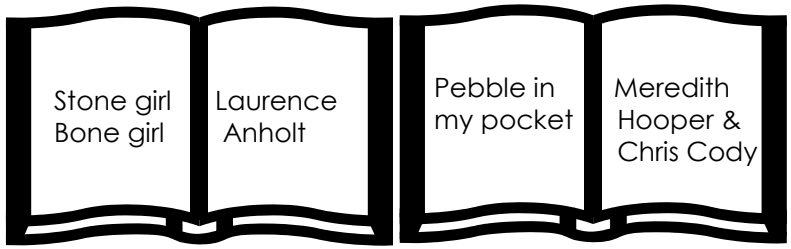
WOW: *Bring in a collection of rocks and let the children touch and talk about them.*

LC1	What are fossils and why are they so fascinating?
LC2	What can you find out about sedimentary and igneous rocks?
LC3	Why is a diamond a 'girl's best friend'?
LC4	Can you collect some rocks to create a rock sculpture?
LC5	Reflection: Can you work as a team to create a power-point presentation about rocks?

Working Scientifically: Observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens or microscope to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them.

Literacy Link: Opportunities here for children to carry out individual research based on rock types, including fossils.

Creative Art Link: Children to plan, design and make a rock sculpture using large, medium and small rocks. These should be photographed and used as part of their reflection presentations.



Short Unit
Year 3: What do rocks tell us about the way the Earth was formed?

Year 3: Science and Art Knowledge, Skills and Understanding

Science – Rocks

- Can they compare and group together different rocks based on their simple physical properties?
- Can they describe and explain how different rocks can be useful to us?
- Can they describe how fossils are formed?
- Can they recognise that soils are formed from rocks and organic matter?

Year 3 (Challenging)

- Can they classify igneous and sedimentary rocks?
- Can they begin to relate the properties of rocks with their uses?

Art & Design

- Can they add onto their work to create texture and shape?
- Can they work with life size materials?
- Can they use their sketch books to express feelings about a subject and to describe likes and dislikes?
- Can they make notes in their sketch books about techniques used by artists?
- Can they suggest improvements to their work by keeping notes in their sketch books?

The Learning Challenge™ CURRICULUM

Science Learning Challenges

Year 4 Science

Year 4 Statutory Requirements

Working Scientifically (Y3 & Y4)	Living Things and their Habitats	Animals, including humans
• asking relevant questions and using different types of scientific enquiries to answer them • setting up simple practical enquiries, comparative and fair tests • making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers • gathering, recording, classifying and presenting data in a variety of ways to help in answering questions • recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables • reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions • using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions • identifying differences, similarities or changes related to simple scientific ideas and processes • using straightforward scientific evidence to answer questions or to support their findings.	• recognise that living things can be grouped in a variety of ways • explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment • recognise that environments can change and that this can sometimes pose dangers to living things.	• describe the simple functions of the basic parts of the digestive system in humans • identify the different types of teeth in humans and their simple functions • construct and interpret a variety of food chains, identifying producers, predators and prey.

Year 4 Statutory Requirements (continued)

States of Matter	Sound	Electricity
• compare and group materials together, according to whether they are solids, liquids or gases • observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) • identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	• identify how sounds are made, associating some of them with something vibrating • recognise that vibrations from sounds travel through a medium to the ear • find patterns between the pitch of a sound and features of the object that produced it • find patterns between the volume of a sound and the strength of the vibrations that produced it • recognise that sounds get fainter as the distance from the sound source increases.	• identify common appliances that run on electricity • construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers • identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery • recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit • recognise some common conductors and insulators, and associate metals with being good conductors.

Science: Year 4 Overview

	ANIMALS, including Humans	LIVING THINGS and their Habitats	STATES OF MATTER	ELECTRICITY	SOUND
YEAR 4	• Digestive System • Teeth • Food chains • Predators and prey	• Identify and name a variety of living things (plants and animals) in the local and wider environment and group them • Recognise that environments can change and can pose dangers	• Solids, Liquids and Gases • Heating and cooling (no baking, etc.) • Evaporation and condensation	• Identify common appliances • Construct simple circuits including switches • Common conductors and insulators • Alternative sources of energy	• Sources • Vibration • Loud and faint • Pitch • Volume • Sound travelling
Possible Learning Challenges	• **What happens to the food we eat?**	• **Which wild animals and plants thrive in your locality?**	• **How would we survive without water?**	• **How could we cope without electricity for one day?**	• **Why is the sound that 'One Direction' makes enjoyed by so many?**

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 4 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 4

Planning	Obtaining and presenting evidence	Considering evidence and evaluating
• Can they set up a simple fair test to make comparisons? • Can they plan a fair test and isolate variables, explaining why it was fair and which variables have been isolated? • Can they suggest improvements and predictions? • Can they decide which information needs to be collected and decide which is the best way for collecting it? • Can they use their findings to draw a simple conclusion?	• Can they take measurements using different equipment and units of measure and record what they have found in a range of ways? • Can they make accurate measurements using standard units? • Can they explain their findings in different ways (display, presentation, writing)?	• Can they find any patterns in their evidence or measurements? • Can they make a prediction based on something they have found out? • Can they evaluate what they have found using scientific language, drawings, labelled diagrams, bar charts and tables? • Can they use straightforward scientific evidence to answer questions or to support their findings? • Can they identify differences, similarities or changes related to simple scientific ideas or processes?

Year 4 (Challenging)

• Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they use test results to make further predictions and set up further comparative tests?	• Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?	• Can they report findings from investigations through written explanations and conclusions? • Can they use a graph or diagram to answer scientific questions?

Knowledge, Skills and Understanding breakdown for Living Things, their Habitats and Animals, including humans

Year 4

Animals, including humans	Living Things and their Habitats
• Can they identify and name the basic parts of the digestive system in humans? • Can they describe the simple functions of the basic parts of the digestive system in humans? • Can they identify the simple function of different types of teeth in humans? • Can they compare the teeth of herbivores and carnivores? • Can they explain what a simple food chain shows? • Can they construct and interpret a variety of food chains, identifying producers, predators and prey?	• Can they recognise that living things can be grouped in a variety of ways? • Can they explore and use a classification key to group, identify and name a variety of living things? (plants, vertebrates, invertebrates) • Can they compare the classification of common plants and animals to living things found in other places? (under the sea, prehistoric) • Do they recognise that environments can change and this can sometimes pose a danger to living things?

Year 4 (Challenging)

• Can they classify living things and non-living things by a number of characteristics that they have thought of? • Can they explain how people, weather and the environment can affect living things? • Can they explain how certain living things depend on one another to survive?	• Can they give reasons for how they have classified animals and plants, using their characteristics and how they are suited to their environment? • Can they explore the work of pioneers in classification? (e.g. Carl Linnaeus) • Can they name and group a variety of living things based on feeding patterns? (producer, consumer, predator, prey, herbivore, carnivore, omnivore)

Knowledge, Skills and Understanding breakdown for States of Matter

Year 4

States of Matter

- Can they compare and group materials together, according to whether they are solids, liquids or gases?
- Can they explain what happens to materials when they are heated or cooled?
- Can they measure or research the temperature at which different materials change state in degrees Celsius?
- Can they use measurements to explain changes to the state of water?
- Can they identify the part that evaporation and condensation has in the water cycle?
- Can they associate the rate of evaporation with temperature?

Year 4 (Challenging)

- Can they group and classify a variety of materials according to the impact of temperature on them?
- Can they explain what happens over time to materials such as puddles on the playground or washing hanging on a line?
- Can they relate temperature to change of state of materials?

Knowledge, Skills and Understanding breakdown for Sound and Electricity

Year 4

Sound	Electricity
• Can they describe a range of sounds and explain how they are made? • Can they associate some sounds with something vibrating? • Can they compare sources of sound and explain how the sounds differ? • Can they explain how to change a sound (louder/softer)? • Can they recognise how vibrations from sound travel through a medium to a ear? • Can they find patterns between the pitch of a sound and features of the object that produce it? • Can they find patterns between the volume of the sound and the strength of the vibrations that produced it? • Can they recognise that sounds get fainter as the distance from the sound source increases? • Can they explain how you could change the pitch of a sound? • Can they investigate how different materials can affect the pitch and volume of sounds?	• Can they identify common appliances that run on electricity? • Can they construct a simple series electric circuit? • Can they identify and name the basic part in a series circuit, including cells, wires, bulbs, switches and buzzers? • Can they 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? • Can they recognise that a switch opens and closes a circuit? • Can they associate a switch opening with whether or not a lamp lights in a simple series circuit? • Can they recognise some common conductors and insulators? • Can they associate metals with being good conductors?

Year 4 (Challenging)

• Can they explain why sound gets fainter or louder according to the distance? • Can they explain how pitch and volume can be changed in a variety of ways? • Can they work out which materials give the best insulation for sound?	• Can they explain how a bulb might get lighter? • Can they recognise if all metals are conductors of electricity? • Can they work out which metals can be used to connect across a gap in a circuit? • Can they explain why cautions are necessary for working safely with electricity?

Year 4: What happens to the food we eat?

- **Science Y4: Animals, including Humans**
- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey.

WOW: *Children to eat a piece of chocolate at the beginning of the day with a view to tracking its journey through the body. Life Caravan visits school.*

LC1	What happens to that piece of chocolate once you swallow it?
LC2	Why would it not be sensible to eat a burger everyday?
LC3	What is the digestive system and why is it so important?
LC4	How can you make a simple model, using junk material, to show how the digestive system works?
LC5	Why is it important to brush your teeth each day?
LC6	Why are shark's teeth different to our teeth?
LC7	How can we create a dance that shows the movement of food through our body?
LC8	Reflection: How can you make a presentation that would help a group of younger children understand what happens in your body?

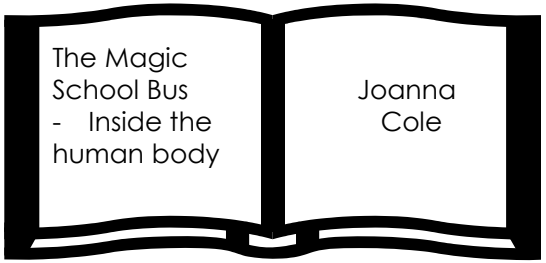
Working Scientifically: Comparing the teeth of carnivores and herbivores, and suggesting reasons for differences; finding out what damages teeth and how to look after them. They might draw and discuss their ideas about the digestive system and compare them with models or images.

Literacy Link: Adventure story: Imagine being shrunk and being swallowed by mistake

Numeracy Link: Time intervals – looking at the journey of the chocolate through the body
- Graph work on food types

Creative Art Link: Children to design and make a model to represent the digestive system and its working.

Expressive Art Link: Children will perform a dance working in groups, which will show the movement of food through the body.



Year 4: What happens to the food we eat?

Year 4: Science, Art and DT Knowledge, Skills and Understanding

Year 4 Science: Animals, including humans

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts and tables?

- Can they identify and name the basic parts of the human digestive system?
- Can they describe the function of the organs of the human digestive system?
- Can they identify the simple function of different types of human teeth?
- Can they compare the teeth of herbivores and carnivores?
- Can they explain what a simple food chain shows?

Year 4 Science: (Challenging)

- Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?
- Can they report findings from investigations through written explanations and conclusions?
- Can they use a graph or diagram to answer scientific questions?

Art & Design : Drawing

- Can they begin to show facial expressions and body language in their sketches?
- Can they identify and draw simple objects, and use marks and lines to produce texture?
- Can they organise line, tone, shape and colour to represent figures and forms in movement?
- Can they show reflections?
- Can they explain why they have chosen specific materials to draw with?

Design Technology

- Can they come up with at least one idea about how to create their product?
- Do they take account of the ideas of others when designing?
- Can they produce a plan and explain it to others?
- Can they suggest some improvements and say what was good and not so good about their original design?
- Can they tell if their finished product is going to be good quality?
- Are they conscious the need to produce something that will be liked by others?
- Can they show a good level of expertise when using a range of tools and equipment?
- Have they thought of how they will check if their design is successful?
- Can they begin to explain how they can improve their original design?
- Can they evaluate their product, thinking of both its appearance and the way it works?

Year 4: Which wild animals and plants thrive in your locality?

Science Y4: Living Things and their Habitats

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

WOW: Visit to a Garden Centre	
LC1	Which wild flowers will we find within a Km of our school?
LC2	How would Georgia O'Keefe have painted these flowers?
LC3	Would dinosaurs have roamed around your locality in the past?
LC4	Why did dinosaurs die out?
LC5	Why are there large wild animals like the tiger in danger of extinction today?
LC6	Which birds can we see out of our classroom window?
LC7	How can we encourage more birds to visit our school?
LC8	Reflection: Can you create a documentary about saving a species of your choice.

Working Scientifically: explore local small invertebrates and using guides or keys to identify them; making a guide to local living things; raising and answering questions based on their observations of animals and what they have found out about other animals that they have researched.

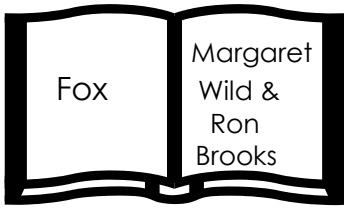
Literacy Link: Develop fact files about wild flowers and endangered animals

Numeracy Link: Classification of plants and birds, leading to graphs and tables

Creative Art Link: Taking photographs of flowers in the manner that Georgia O'Keefe would have done.

- Develop pencil sketches from the photographs
- Paint – water colour or acrylic

Creative Art Link: Designing and making a bird box which will be used to help attract birds to the immediate area around the school



Year 4: Which wild animals and plants will we find in your locality?

Year 4: Science, Art and DT Knowledge, Skills and Understanding

Year 4 Science: All Living Things

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts and tables?

- Can they use a classification key to group a variety of living things? (plants, vertebrates, invertebrates)
- Can they compare the classification of common plants and animals to living things found in other places? (under the sea, prehistoric)
- Can they name and group a variety of living things based on feeding patterns? (producer, consumer, predator, prey, herbivore, carnivore, omnivore)

Year 4 Challenging

- Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?
- Can they report findings from investigations through written explanations and conclusions?
- Can they use a graph or diagram to answer scientific questions?

Art & Design

- Can they create all the colours they need?
- Can they create mood in their paintings?
- Do they successfully use shading to create mood and feeling?
- Can they use their sketch books to express their feelings about various subjects and outline likes and dislikes?
- Can they produce a montage all about themselves?
- Do they use their sketch books to adapt and improve their original ideas?
- Do they keep notes about the purpose of their work in their sketch books?

Design Technology

- Can they come up with at least one idea about how to create their product?
- Do they take account of the ideas of others when designing?
- Can they produce a plan and explain it others?
- Can they suggest some improvements and say what was good and not so good about their original design?
- Can they tell if their finished product is going to be good quality?
- Are they conscious of the need to produce something that will be liked by others?
- Can they show a good level of expertise when using a range of tools and equipment?
- Have they thought of how they will check if their design is successful?
- Can they begin to explain how they can improve their original design?
- Can they evaluate their product, thinking of both appearance and the way it works?

Year 4: How would we survive without water?

Science Y4: States of Matter

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

WOW: *Create different shapes with clay or plasticine and put water into the mould and freeze it.*

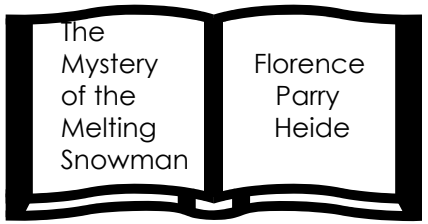
LC1	How can you classify solids, liquids and gases?
LC2	How do we measure temperature and how does temperature vary during the day and across the world?
LC3	How can water be a solid, liquid and gas?
LC4	Which other materials change when they are heated or cooled?
LC5	Where do puddles on the playground disappear to?
LC6	Why do windows sometimes steam up?
LC7	How can you create a dance that shows the three states of water?
LC8	Reflection: Can you put together a presentation to show how water is our life line?

Working Scientifically: Huge opportunities here for children to work scientifically by setting up experiments and investigations associated with changing state.
Exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party.

Literacy Link: There are several opportunities for children to apply their skills in writing and reading in different contexts. These occur in LC1, 2, 3, 4, 5 and 6.

Numeracy Link: There is a natural link with children's maths work on temperature.

Expressive Art Link: Children will be provided with an opportunity to work in a small group and create a dance based on the change of state of water.



Year 4: How would we survive without water?

Year 4: Science and Dance Knowledge, Skills and Understanding

Year 4 Science: States of Matter

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?

- Can they compare and group materials based on their states of matter, ie, liquid, solid or gas?
- Can they explain what happens to materials when they are heated or cooled?
- Can they measure the temperature at which different materials change state?
- Can they use measurements to explain changes to the state of water?
- Can they link changes of state to the water cycle?

Year 4 Challenging

- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they use test results to make further predictions and set up further comparative tests?

- Can they group and classify a variety of materials according to the impact of temperature on them?
- Can they explain what happens over time to materials such as puddles on the playground or washing hanging on a line?
- Can they relate temperature to change of state of materials?

Dance

- Can they respond imaginatively to a range of stimuli related to character and narrative?
- Do they use simple motifs and movement patterns to structure dance phrases on their own, with a partner and in a group?
- Can they refine, repeat and remember dance phrases and dances?
- Can they perform dances clearly and fluently?
- Can they show sensitivity to the dance idea and the accompaniment?
- Do they show a clear understanding of how to warm-up and cool-down safely?
- Do they describe, interpret and evaluate dance, using appropriate language?

Challenging

- Can they structure and vary longer dances?
- Do they develop movement ideas for others?
- Do they show a good sense of rhythm and style when performing?
- Can they remember and perform a range of warm-up and cool-down activities?
- Can they give reasons why physical activity is good for health?
- Do they use a range of dance vocabulary to describe, interpret and evaluate dance?

Year 4: How could we cope without electricity for one day?

- **Science Y4: Electricity**
- **identify common appliances that run on electricity**
- **construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers**
- **identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery**
- **recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit**
- **recognise some common conductors and insulators, and associate metals with being good conductors.**

WOW: *Children to spend a full day without access to electricity. This to be organised and liaised with home.*

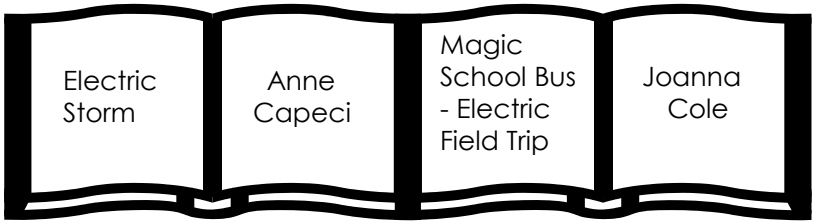
LC1	Why have we become so dependent on electricity?
LC2	How can you create an electrical circuit that has a switch or a buzzer?
LC3	What are conductors and insulators and how are they associated with electricity?
LC4	What! no TV or play-station!: what shall we do?
LC5	Could you create a meal that has not required electricity to prepare it?
LC6	How is electricity generated and what do we mean by alternative sources?
LC7	Reflection: Working as a team, can you put together a presentation which tells us about electricity?

Working Scientifically: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

Literacy Link: Children write a letter to their parents explaining about spending a day without electricity and asking for their support for this to happen at home also.
In addition, there are many opportunities for children to use explanation texts to support their work.

Creative Art Link: Children to design and make a game which they could play as an alternative to an electrically powered game.

Creative Art Link: Children to design, make and plan a meal which they will eat. The issue is that electricity must not have been required when preparing the meal.



Year 4: How could we cope without electricity for one day?

Year 4: Science and DT Knowledge, Skills and Understanding

Year 4 Science: Electricity

- Can they set up a simple fair test to make comparisons?
- Can they plan a fair test and isolate variables and explain why it was fair and explain which variables have been isolated?
- Can they suggest improvements and predictions?
- Can they decide which information needs to be collected and decide which is the best way for collecting it?
- Can they use their findings to draw a simple conclusion?

- Can they explain how electricity is useful to us?
- Can they construct a simple circuit?
- Can they explain what a conductor is and test materials for conductivity?
- Can they explain closed and open circuits?
- Can they construct a circuit with a switch?
- Can they recognise some common conductors and insulators?

Year 4 Challenging

- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they use test results to make further predictions and set up further comparative tests?

- Can they explain how a bulb might get lighter?
- Can they recognise if all metals are conductors of electricity?
- Can they work out which metals can be used to connect across a gap in a circuit?

Design Technology

- Can they come up with at least one idea about how to create their product?
- Do they take account of the ideas of others when designing?
- Can they produce a plan and explain it to others?
- Can they suggest some improvements and say what was good and not so good about their original design?
- Can they tell if their finished product is going to be good quality?
- Are they conscious of the need to produce something that will be liked by others?
- Can they show a good level of expertise when using a range of tools and equipment?
- Have they thought of how they will check if their design is successful?
- Can they begin to explain how they can improve their original design?
- Can they evaluate their product, thinking of both its appearance and the way it works?
- **Food Technology**: Do they know what to do to be hygienic and safe?
- Have they thought what they can do to present their product in an interesting way?
- **Using materials:** Can they measure carefully so as to make sure they have not made mistakes?
- How have they attempted to make their product strong?

Year 4: Why is the sound that 'One Direction' makes enjoyed by so many?

Science Y4: Sound

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

WOW: *Listen to a range of different music: rock, classical and opera and discuss likes and dislikes*

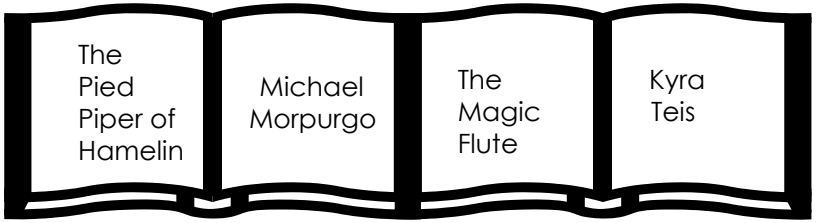
LC1	What caused that 'racket'?
LC2	How do your ears work?
LC3	What do we mean by the pitch and volume of the sound?
LC4	Does sound have the same intensity the further away you go from the source?
LC5	Could you be the next X Factor star?
LC6	What do we know about the way telephones work and how have they changed over time?
LC7	Reflection: A performance in the style of an X Factor talent show but with a strong emphasis on why some may prefer one source of music as opposed to another.

Working Scientifically: Finding patterns in the data (for example, blowing across the top of bottles, changing the length and thickness of elastic bands). They might make earmuffs from a variety of different materials to investigate which provides the best insulation against sound. They could make and play their own instruments by using what they have found out about pitch and volume.

Expressive Arts Link: This is a music appreciation opportunity with children being encouraged to be precise about their likes and dislikes in relation to a range of music provided for them.

Numeracy Link: Many opportunities through this challenge to create tables, graphs as well as measure.

Expressive Art Link: Children will perform as a group with some performing and others directing as their talents allow. This will end up as a performance for the whole school or for a selection of pupils and staff.



Year 4: Why is the sound that 'One Direction' makes enjoyed by so many?

Year 4: Science and Music Knowledge, Skills and Understanding

Year 4 Science: Sound

- Can they take measurements using different equipment and units of measure and record what they have found in a range of ways?
- Can they make accurate measurements using standard units?
- Can they explain their findings in different ways (display, presentation, writing)?
- Can they find any patterns in their evidence or measurements?
- Can they make a prediction based on something they have found out?
- Can they record and present what they have found using scientific language, drawings, labeled diagrams, bar charts, keys and tables?

- Can they describe a range of sounds and explain how they are made?
- Can they compare sources of sound and explain how the sounds differ?
- Can they explain how to change a sound (louder/softer)?
- Can they describe and explain how a sound travels from a source to our ears?
- Can they explain what happens to sound as it travels away from its source?
- Can they explain how you could change the pitch of a sound?
- Can they investigate how different materials can affect the pitch and volume of sounds?

Year 4 Challenging

- Can they explain why sound gets fainter or louder according to the distance?
- Can they explain how pitch and volume can be changed in a variety of ways?
- Can they work out which materials give the best insulation for sound?

Music

- Can they explain the place of silence and say what effect it has?
- Can they start to identify the character of a piece of music?
- Can they describe and identify the different purposes of music?
- Can they begin to identify with the style of work of Beethoven, Mozart and Elgar?
- Can they perform a simple part rhythmically?
- Can they sing songs from memory with accurate pitch?
- Can they improvise using repeated patterns?

Science
Upper Key Stage 2

Upper Key Stage 2

Science Programme of Study: Upper Key Stage 2

- The principal focus of science teaching in **upper key stage 2** is to enable pupils to develop a deeper understanding of a wide range of scientific ideas. They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically. At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates. They should also begin to recognise that scientific ideas change and develop over time. They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information. Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.
- 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must **always** be taught through and clearly related to substantive science content in the programme of study. Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
- Pupils should read, spell and pronounce scientific vocabulary correctly.

Science
Learning Challenges

Year 5

Year 5 Statutory Requirements

Working Scientifically (Y5 & Y6)	Living Things and their habitats	Animals, including humans
• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird • describe the life process of reproduction in some plants and animals.	• describe the changes as humans develop to old age.

Year 5 Statutory Requirements (continued)

Properties and changes of materials	Earth and Space	Forces
• compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets • know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution • use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating • give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic • demonstrate that dissolving, mixing and changes of state are reversible changes • explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.	• describe the movement of the Earth, and other planets, relative to the Sun in the solar system • describe the movement of the Moon relative to the Earth • describe the Sun, Earth and Moon as approximately spherical bodies • use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	• explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object • identify the effects of air resistance, water resistance and friction, that act between moving surfaces • recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

Science: Year 5 Overview

	Living things and their habitats	Animals, including humans	Properties & changes of materials	Earth and space	Forces
YEAR 5	• Life cycles of plants and animals • Birth, growth, development and reproduction	• Changes as humans develop from birth to old age	• Dissolving • Evaporating • Filtering • Reversible and Irreversible changes	• Earth relative to the Sun • Moon relative to the Earth • Relationship between Sun, Earth and Moon • Earth's rotation • Day and night	• Gravity • Air Resistance • Water Resistance • Friction • Gears, Pulleys, Leavers and Springs
Possible Learning Challenges	• **Do all animals and plants start life as an egg?**	• **How different will you be when you are as old as your grandparents?**	• **Could you be the next CSI investigator?**	• **Will we ever send another human to the moon?**	• **Can you feel the force?**

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 5 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 5

Planning	Obtaining and presenting evidence	Considering evidence and evaluating
• Can they plan and carry out a scientific enquiry to answer questions, including recognising and controlling variables where necessary? • Can they make a prediction with reasons? • Can they use test results to make predictions to set up comparative and fair tests? • Can they present a report of their findings through writing, display and presentation?	• Can they take measurements using a range of scientific equipment with increasing accuracy and precision? • Can they take repeat readings when appropriate? • Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar and line graphs?	• Can they report and present findings from enquiries through written explanations and conclusions? • Can they use a graph to answer scientific questions?

Year 5 (Challenging)

• Can they explore different ways to test an idea, choose the best way and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? • Can they use information to help make a prediction? • Can they explain, in simple terms, a scientific idea and what evidence supports it?	• Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated?	• Can they find a pattern from their data and explain what it shows? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this?

Knowledge, Skills and Understanding breakdown for Living Things, their Habitats and Animals, including humans

Year 5

Animals, including humans	Living things and their habitats
• Can they describe the changes as humans develop to old age?	• Can they describe the differences in the life cycles of a mammal, an amphibians, an insects and a bird? • Can they describe the life cycles of common plants? • Can they explore the work of well know naturalists and animal behaviourists? (David Attenborough and Jane Goodall)

Year 5 (Challenging)

• Can they create a timeline to indicate stages of growth in certain animals, such as frogs and butterflies? • Can they describe the changes experienced in puberty? • Can they draw a timeline to indicate stages in the growth and development of humans?	• Can they observe their local environment and draw conclusions about life-cycles, e.g. plants in the vegetable garden or flower border? • Can they compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, e.g. rainforests?

Knowledge, Skills and Understanding breakdown for Properties and Changes to Materials

Year 5

Properties and changes to materials

- Can they compare and group together everyday materials on the basis of their properties, including hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets?
- Can they explain how some materials dissolve in liquid to form a solution?
- Can they describe how to recover a substance from a solution?
- Can they use their knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving, evaporating?
- Can they give reasons, based on evidence for comparative and fair tests for the particular uses of everyday materials, including metals wood and plastic?
- Can they describe changes using scientific words? (evaporation, condensation)
- Can they demonstrate that dissolving, mixing and changes of state are reversible changes?
- Can they explain that some changes result in the formation of new materials, and that this kid of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda?
- Can they use the terms 'reversible' and 'irreversible'?

Year 5 (challenging)

- Can they describe methods for separating mixtures? (filtration, distillation)
- Can they work out which materials are most effective for keeping us warm or for keeping something cold?
- Can they use their knowledge of materials to suggest ways to classify? (solids, liquids, gases)
- Cant hey explore changes that are difficult to reverse, e.g. burning, rusting and reactions such as vinegar with bicarbonate of soda?
- Can they explore the work of chemists who created new materials, e.g. Spencer Silver (glue on sticky notes) or Ruth Benerito (wrinkle free cotton)?

Knowledge, Skills and Understanding breakdown for Earth, Space and Forces

Year 5

Earth and Space	Forces
• Can they identify and explain the movement of the Earth and other plants relative to the sun in the solar system? • Can they explain how seasons and the associated weather is created? • Can they describe and explain the movement of the Moon relative to the Earth? • Can they describe the sun, earth and moon as approximately spherical bodies? • Can they use the idea of the earth's rotation to explain day and night and the apparent movement of the sun across the sky?	• Can they explain that unsupported objects fall towards the earth because of the force of gravity acting between the earth and the falling object? • Can they identify the effects of air resistance, water resistance and friction that act between moving surfaces? • Can they recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect?

Year 5 (Challenging)

• Can they compare the time of day at different places on the earth? • Can they create shadow clocks? • Can they begin to understand how older civilizations used the sun to create astronomical clocks, e.g. Stonehenge? • Can they explore the work of some scientists? (Ptolemy, Alhazen, Copernicus)	• Can they describe and explain how motion is affected by forces? (including gravitational attractions, magnetic attraction and friction) • Can they design very effective parachutes? • Can they work out how water can cause resistance to floating objects? • Can they explore how scientists, such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation?

Year 5: Do all animals and plants start life as an egg?

Science Y5: Living Things and their Habitats

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.

WOW: *Show clips of film of animals hunting each other and talk about life cycles.*

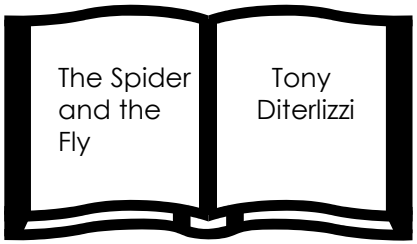
LC1	Can you work out which animals depend on each other for survival?
LC2	What would you ask David Attenborough or Jane Goodall if you met them?
LC3	How can you create a presentation to show the life cycle of a butterfly or a frog?
LC4	Do all animals start life as an egg?
LC5	How do humans change as they grow?
LC6	Can you recreate the life cycle of a butterfly in using music and dance?
LC7	How can you create art from the environment?
LC8	Reflection: Children to create a poster of a chosen animal or plant showing its life cycle.

Working Scientifically: observe and compare the life cycles of plants and animals in their local environment with other plants and animals around the world (in the rainforest, in the oceans, in desert areas and in prehistoric times), ask pertinent questions and suggest reasons for similarities and differences.

Literacy Link: There are many opportunities to link Literacy within this LC. In LC1 explanation texts (use the Spider and the Fly book); LC2 devising questions, etc.

Expressive Arts Link: In LC6 children will be provided with opportunities to write their own music and create their own dance taking the life cycle of a butterfly as their stimuli.

Creative Art Link: Children will look at the work of Andy Goldsworthy or Simon Watts and use items they find in the environment to create a 3D piece of art.



Year 5: Do all animals and plants start life as an egg?

Year 5: Science, Art, Music and Dance Knowledge, Skills and Understanding

Year 5 Science: Living Things and their habitats

- Can they describe and compare the life cycles of a range of animals, including humans, amphibians, insects and birds?
- Can they describe the life cycles of common plants?
- Can they talk with knowledge about birth, reproduction and death of familiar animals or plants?
- Can they explore the work of well know naturalists? (David Attenborough and Jane Goodall)

- Can they report findings from investigations through written explanations and conclusions?
- Can they use a graph to answer scientific questions?

Art & Design

- Do they experiment with and combine materials and processes to design and make 3D form?
- Do they learn about the work of others by looking at their work in books, the Internet, visits to galleries and other sources of information?
- Do they keep notes in their sketch books as to how they might develop their work further?
- Do they use their sketch books to compare and discuss ideas with others?
- Can they combine visual and tactile qualities?

Year 5 Challenging

- Can they observe their local environment and draw conclusions about life-cycles? (for example, the vegetable garden or flower border)
- Can they compare the life cycles of plants and animals in their local environment with the life cycles of those around the world, eg rainforests?

- Can they explain (in simple terms) a scientific idea and what evidence supports it?

Music and Dance

- Can they change sounds or organise them differently to change the effect?
- Can they compose music which meets specific criteria?
- Can they choose the most appropriate tempo for a piece of music?

- Do they plan and perform dances confidently?
- Can they compose motifs and plan dances creatively and collaboratively in groups?
- Can they adapt and refine the way they use weight, space and rhythm in their dances to express themselves in the style of dance they use?
- Can they perform different styles of dance clearly and fluently?
- Do they organise their own warm-up and cool-down exercises?

Year 5: How different will you be when you are as old as your grandparents?

Science Y5: Animals (including Humans) • describe the changes as humans develop to old age.	
WOW: *Use the photographic app that shows what they will look like in 20 years time and talk about what their feelings are, etc.*	
LC1	Choose a baby, themselves, a teenager, a young adult, their parents and their grandparents and create a chart to find out about what they can and cannot do?
LC2	What can you now do that you couldn't do when you were a baby?
LC3	Do we all have the same X Factor?
LC4	What are the important things we should do to keep fit and healthy?
LC5	What do we understand by the term 'puberty'? (non statutory)
LC6	Through drawing and painting, can you accurately sketch yourself and your grandparent?
LC7	What is the life expectancy of different animals?
LC8	Reflection: How would you wish to be remembered as you make your journey through life?

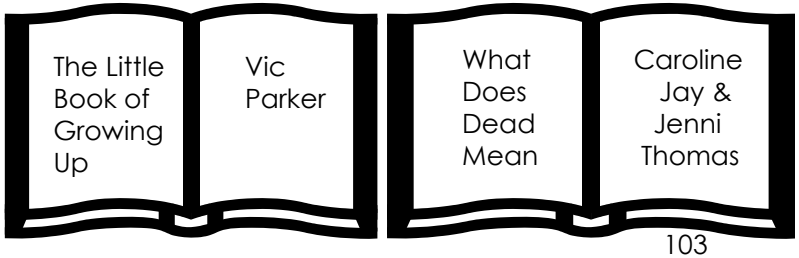
Working Scientifically: compare data about the gestation periods of humans and other animals or find out and record the length and mass of a baby as it grows.

Literacy Link: Many opportunities here for reflective writing (LC2); explanation texts (LC4) and (LC5).

Numeracy Links: Many opportunities in this LC for children to carry out measurements and create graphs and charts.

Creative Art Link: Opportunities in LC6 for children to create a self-portrait having looked at a range of artists' work. They will then create another drawing or painting of an older person's face and try to capture the differences.

LC7 This LC provides opportunities for you to deal with the issues associated with death in as much depth as you would wish to.



Year 5: How different will you be when you are as old as your grandparents?

Year 5: Science and Art Knowledge, Skills and Understanding

Year 5 Science: Animals (including Humans)

- Can they create a timeline to indicate stages of growth in humans?
- Can they explain what puberty is? (non statutory)
- Do they appreciate that all animals will eventually die?
- Can they explain why different animals have a different life expectancy?

- Can they make a prediction with reasons?
- Can they use test results to make further predictions and set up further comparative tests?
- Can they present a report of their findings through writing, display and presentation?
- Can they take measurements using a range of scientific equipment with increasing accuracy and precision?
- Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models?

Art & Design

- Do they successfully use shading to create mood and feeling?
- Can they organise line, tone, shape and colour to represent figures and forms in movement?
- Can they explain why they have chosen specific materials to draw with?
- Can they create all the colours they need?
- Can they create mood in their paintings?
- Can they express their emotions accurately through their painting and sketches?
- Do they keep notes in their sketch books as to how they might develop their work further?
- Do they use their sketch books to compare and discuss ideas with others?
- Do they learn about the work of others by looking at their work in books, the Internet, visits to galleries and other sources of information?

Year 5 Challenging

- Can they create a timeline to indicate stages of growth in certain animals, such as frogs and butterflies?

- Can they explain (in simple terms) a scientific idea and what evidence supports it?
- Can they decide which units of measurement they need to use?
- Can they explain why a measurement needs to be repeated?
- Can they find a pattern from their data and explain what it shows?
- Can they link what they have found out to other science?
- Can they suggest how to improve their work and say why they think this?

Year 5: Could you be the next CSI investigator?

Science Y5: Properties and Changes of Materials

- compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

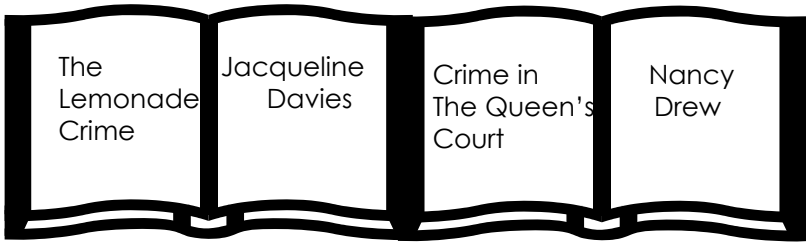
WOW: *Burn a number of different materials, examine the remains and see whether the original item can be identified.*

LC1	Can you think of five materials that can be changed and reversed and five that cannot?
LC2	How have scientists made use of changes to create materials that make our lives easier, e.g. cling film?
LC3	Which materials dissolve and evaporate and why can this sometimes be an important quality in those materials?
LC4	How are reversible and irreversible changes important to forensic scientists?
LC5	How could you solve a crime by using forensic evidence?
LC6	What is bicarbonate of soda and what impact does it have on different materials?
LC7	Using finger prints as well as hand and foot prints, can you create an interesting piece of art work that has interesting design features?
LC8	Reflection: Create your own version of 'Brainiac' and present it to Key Stage 1 children.

Working Scientifically: carry out tests to answer questions such as 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example when burning different materials or baking bread or cakes.

Literacy Link: There are many opportunities to make use of a range of literacy skills in this LC. For example there are opportunities in LC2 to find out about a particular scientist's work, e.g. Ruth Benerito or Spencer Silver.

Creative Art Link: LC7 provides opportunities for children to consider the work of Salvador Dali and then create their own work using footprints, handprints and fingerprints.



Year 5: Could you be the next CSI investigator?

Year 5: Science and Art Knowledge, Skills and Understanding

Year 5 Science: Materials

- Can they explore different ways to test an idea and choose the best way, and give reasons?
- Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this?
- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they make a prediction with reasons?
- Can they use information to help make a prediction?
- Can they use test results to make further predictions and set up further comparative tests?
- Can they explain (in simple terms) a scientific idea and what evidence supports it?
- Can they present a report of their findings through writing, display and presentation?

- Can they explain how changes can result in the formation of new materials?
- Can they explain what an irreversible change is and give examples?
- Can they explore the work of famous chemists? (Lavoisier, Priestley, Spencer Silver or Ruth Benerito)
- Can they distinguish metals from other solid materials by describing metallic properties?
- Can they explain why some metals rust?
- Can they explain what happens when vinegar or bicarbonate of soda is added to materials?

Year 5 Challenging

- Can they make a prediction which links with other scientific knowledge?
- Can they identify the key factors when planning a fair test?
- Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?

- Can they identify where changes in state take place and explain these?
- Can they give a clear description of what happens when a material is burnt or heated as in cooking?
- Can they give examples of how chemical changes can impact on our lives?
- Can they suggest ways to separate mixtures based on what they know about certain materials?

Art & Design

- Do their sketch books contain detailed notes, and quotes explaining about items?
- Do they compare their methods to those of others and keep notes in their sketch books?
- Do they combine graphics and text based research of commercial design, for example magazines etc., to influence the layout of their sketch books.
- Do they adapt and refine their work to reflect its meaning and purpose, keeping notes and annotations in their sketch books?
- Can they create work which is open to interpretation by the audience?
- Can they include both visual and tactile elements in their work?
- Can they combine pattern, tone and shape?
- Can they overprint using different colours?
- Do they look very carefully at the methods they use and make decisions about the effectiveness of their printing methods?

Year 5: Will we ever send another human to the moon?

Science Y5: Earth and Space

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

WOW: *Visit from a mobile Planetarium or set up a telescope.*

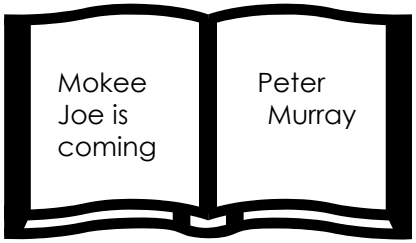
LC1	Could we describe the Earth and the Sun as space cousins?
LC2	If the Earth and Sun are cousins, is the Moon a young nephew?
LC3	Can you explain why we have day and night?
LC4	How can we appreciate the distances between and the sizes of the Sun, Earth and Moon?
LC5	What can we learn about the solar system and the other planets in it?
LC6	Who was Neil Armstrong and what would you ask him if you met him?
LC7	How could you create a moon surface and create a moon buggy?
LC8	Reflection: Could you create a simulated moon landing and film it?

Working Scientifically: compare the time of day at different places on the Earth through internet links and direct communication; create simple models of the solar system; construct simple shadow clocks and sundials, calibrated to show midday and the start and end of the school day; find out why some people think that structures such as Stonehenge might have been used as astronomical clocks.

Literacy Link: LC5 provides opportunities for children to complete a fact file on a chosen planet.
They could also complete a set of questions they would ask Neil Armstrong (LC6).

Numeracy Link: LC4 provides a great deal of opportunity for children to measure and use scale and create diagrams.

Creative Art Link: Children to design and make a model to represent the moon surface and then to create a buggy. They will film this later as part of their reflection.



Year 5: Will we ever send another human to the moon?

Year 5: Science and DT Knowledge, Skills and Understanding

Year 5 Science: Earth and Space

- Can they identify and explain the movement of the Earth relative to the Sun?
- Can they explain how seasons and the associated weather are created?
- Can they identify and explain the movement of the Moon relative to the Earth?
- Can they explain the size, shape and position of the Earth, Sun and Moon?
- Can they explain how night and day are created and use diagrams to show this?
- Can they explain how planets are linked to stars?

Year 5 Challenging

- Can they compare the time of day at different places on the Earth?
- Can they create shadow clocks?
- Can they begin to understand how older civilizations used the Sun to create astronomical clocks?
- Can they explore the work of some scientists? (Ptolemy, Alhazen, Copernicus)

Design & Technology

- Can they come up with a range of ideas after they have collected information?
- Do they take a user's view into account when designing?
- Can they produce a detailed step-by-step plan?
- Can they suggest some alternative plans and say what the good points and drawbacks are about each?
- Can they explain why their finished product is going to be of good quality?
- Can they explain how their product will appeal to the audience?
- Can they use a range of tools and equipment expertly?
- Do they keep checking that their design is the best it can be?
- Do they check whether anything could be improved?
- Can they evaluate appearance and function against the original criteria?
- **Using materials:** Are their measurements accurate enough to ensure that everything is precise?
- How have they ensured that their product is strong and fit for purpose?
- Are they motivated enough to refine and improve their product?
- Do they persevere through different stages of the making process?

Year 5: Can you feel the force?

Science Y5: Forces

- explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

WOW: *Find a hill to run up and down and consider the question, 'Why does it take longer to run up rather than down a hill?'*

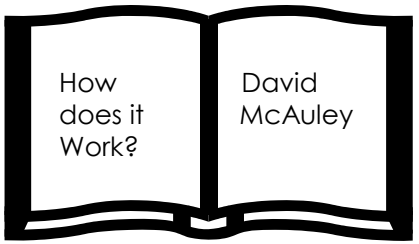
LC1	What is friction and how does it affect moving objects?
LC2	Why will a car always move faster than a boat?
LC3	What is gravity and why is Isaac Newton linked to it?
LC4	Can you design and make a parachute to help you understand more about air resistance?
LC5	How do builders get heavy items onto the top of skyscrapers?
LC6	Can you design, make and evaluate a structure that will propel a marble as far as possible?
LC7	What helps you to climb hills on your bicycle?
LC8	Reflection: Put together a presentation to show the advantages and disadvantages of friction in your life.

Working Scientifically: explore falling paper cones or cup-cake cases, and design and make a variety of parachutes and carrying out fair tests to determine which designs are the most effective. They might explore resistance in water by making and testing boats of different shapes. They might design and make artefacts that use simple levers, pulleys, gears and/or springs and explore their effects.

Literacy Link: Many possibilities exist for children to write in a range of genres, especially in LC1 and LC3.

Numeracy Link: In LC1 and LC4 there are huge expectations that children's measuring skills are required to be accurate.

Creative Art Link: In LC6 children should design and make a structure from any chosen material that will propel a marble as far as possible. This will be competition to find the person being most successful.



Year 5: Can you feel the force?

Year 5: Science and DT Knowledge, Skills and Understanding

Year 5 Science: Forces

- Can they explore different ways to test an idea, choose the best way, and give reasons?
- Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this?
- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they make a prediction with reasons?
- Can they use information to help make a prediction?
- Can they use test results to make further predictions and set up further comparative tests?
- Can they explain (in simple terms) a scientific idea and what evidence supports it?
- Can they present a report of their findings through writing, display and presentation?

- Can they explain what gravity is and its impact on our lives?
- Can they explain why a wheeled object that is initially pushed will slow down and stop?
- Can they explain the impact of friction on a moving object?
- Can they explain the effect of drag force on moving objects?
- Can they explain how force and motion can be transferred through gears, pulleys, levers and springs?

Year 5 Challenging

- Can they make a prediction which links with other scientific knowledge?
- Can they identify the key factors when planning a fair test?
- Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?

- Can they describe and explain how motion is affected by forces? (including gravitational attractions, magnetic attraction and friction)
- Can they design very effective parachutes?
- Can they work out how water can cause resistance to floating objects?

Design & Technology

- Can they use a range of information to inform their design?
- Can they use market research to inform plans?
- Can they work within constraints?
- Can they follow and refine their plan if necessary?
- Can they justify their plan to someone else?
- Do they consider culture and society in their designs?
- Can they use tools and materials precisely?
- Do they change the way they are working if needed?
- How well do they test and evaluate their final product?
- Is it fit for purpose?
- What would improve it?
- Would different resources have improved their product?
- Would they need more or different information to make it even better?
- Can they justify why they selected specific materials?
- Can they work within a budget?
- How have they ensured that their work is precise and accurate?
- Can they hide joints so as to improve the look of their product?

The Learning Challenge™ CURRICULUM

Science Learning Challenges

Year 6 Science

Year 6 Statutory Requirements

Working Scientifically (Y5 & Y6)	Living things and their habitats	Animals, including humans
• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary • taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate • recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs • using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments.	• describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals • give reasons for classifying plants and animals based on specific characteristics.	• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood • recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function • describe the ways in which nutrients and water are transported within animals, including humans.

Year 6 Statutory Requirements (continued)

Evolution and inheritance	Light	Electricity
• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago • recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents • identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	• recognise that light appears to travel in straight lines • use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye • explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes • use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.	• associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit • compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches • use recognised symbols when representing a simple circuit in a diagram.

Science: Year 6 Overview

	LIVING THINGS and their Habitats	ANIMALS, including Humans	EVOLUTION and INHERITANCE	LIGHT	ELECTRICITY
YEAR 6	• Classification of living things • Vertebrates and invertebrates • Classifying reptiles, amphibians, mammals, insects, etc.	• Circulatory system • Heart, blood vessels • Diet, exercise and drugs • Transport of nutrients through the body	• Fossils tell us about the past • Off spring • Changes to the human skeleton over time • Darwin	• How light travels • The eye • Shadows	• Electrical circuits (series) • Designing traffic lights
Possible Learning Challenge	• **Could Spiderman really exist?**	• **What would a journey through your body be like?**	• **Have we always looked like this?**	• **How can you light up your life?**	• **Could you be the next Nintendo apprentice?**

Scientific Knowledge, Skills and Understanding within the National Curriculum

Year 6 Science

Knowledge, Skills and Understanding breakdown for Working Scientifically

Year 6

Planning	Obtaining and presenting evidence	Considering evidence and evaluating
• Can they explore different ways to test an idea, choose the best way, and give reasons? • Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this? • Can they plan and carry out an investigation by controlling variables fairly and accurately? • Can they make a prediction with reasons? • Can they use information to help make a prediction? • Can they use test results to make further predictions and set up further comparative tests? • Can they explain, in simple terms, a scientific idea and what evidence supports it? • Can they present a report of their findings through writing, display and presentation?	• Can they explain why they have chosen specific equipment? (incl ICT based equipment) • Can they decide which units of measurement they need to use? • Can they explain why a measurement needs to be repeated? • Can they record their measurements in different ways? (incl bar charts, tables and line graphs) • Can they take measurements using a range of scientific equipment with increasing accuracy and precision?	• Can they find a pattern from their data and explain what it shows? • Can they use a graph to answer scientific questions? • Can they link what they have found out to other science? • Can they suggest how to improve their work and say why they think this? • Can they record more complex data and results using scientific diagrams, classification keys, tables, bar charts, line graphs and models? • Can they report findings from investigations through written explanations and conclusions? • Can they identify scientific evidence that has been used to support to refute ideas or arguments? • Can they report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations?

Year 6 (Challenging)

• Can they choose the best way to answer a question? • Can they use information from different sources to answer a question and plan an investigation? • Can they make a prediction which links with other scientific knowledge? • Can they identify the key factors when planning a fair test? • Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?	• Can they plan in advance which equipment they will need and use it well? • Can they make precise measurements? • Can they collect information in different ways? • Can they record their measurements and observations systematically? • Can they explain qualitative and quantitative data?	• Can they draw conclusions from their work? • Can they link their conclusions to other scientific knowledge? • Can they explain how they could improve their way of working?

Knowledge, Skills and Understanding breakdown for Living Things, their Habitats and Animals, including humans

Year 6

Evolution and Inheritance	Living Things & their habitats	Animals, including humans
• Can they recognise that living things have changed over time and that fossils provide information about living things that inhabited the earth millions of years ago? • Can they recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents? • Can they give reasons why offspring are not identical to each other or to their parents? • Can they explain the process of evolution and describe the evidence for this? • Can they identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution?	• Can they describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences including microorganisms, plants and animals? • Can they give reasons for classifying plants and animals based on specific characteristics?	• Can they identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood? • Can they recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function? • Can they describe the ways in which nutrients and water and transported within animals, including humans?

Year 6 (Challenging)

• Can they talk about the work of Charles Darwin, Mary Anning and Alfred Wallace? • Can they explain how some living things adapt to survive in extreme conditions? • Can they analyse the advantages and disadvantages of specific adaptations, such as being on two rather than four feet? • Can they begin to understand what is meant by DNA?	• Can they explain why classification is important? • Can they readily group animals into reptiles, fish, amphibians, birds and mammals? • Can they sub divide their original groupings and explain their divisions? • Can they group animals into vertebrates and invertebrates? • Can they find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification?	• Can they explore the work of medical pioneers, for example, William Harvey and Galen and recognise how much we have learnt about our bodies? • Can they compare the organ systems of humans to other animals? • Can they make a diagram of the human body and explain how different parts work and depend on one another? • Can they name the major organs in the human body? • Can they locate the major human organs? • Can they make a diagram that outlines the main parts of a body?

Knowledge, Skills and Understanding breakdown for Light and Electricity

Year 6

Electricity	Light
• Can they identify and name the basic parts of a simple electric series circuit? (cells, wires, bulbs, switches, buzzers) • Can they compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers, the on/off position of switches? • Can they use recognised symbols when representing a simple circuit in a diagram?	• Can they recognise that light appears to travel in straight lines? • Can they 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? • Can they explain that we see things because light travels from light sources to our eyes or from light sources to object s and then to our eyes? • Can they use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them?

Year 6 (Challenging)

• Can they make their own traffic light system or something similar? • Can they explain the danger of short circuits? • Can they explain what a fuse is? • Can they explain how to make changes in a circuit? • Can they explain the impact of changes in a circuit? • Can they explain the effect of changing the voltage of a battery?	• Can they explain how different colours of light can be created? • Can they use and explain how simple optical instruments work? (periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope) • Can they explore a range of phenomena, including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters.

Year 6: Could Spiderman really exist?

Science Y6: Living Things and their Habitats

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

WOW: *Consider the attributes that Spiderman has and give realistic thought to whether these could exist in any creature we know.*

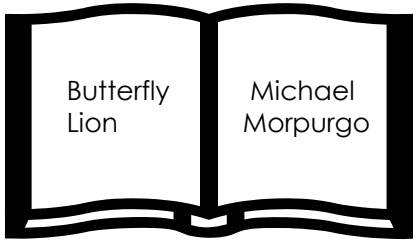
LC1	Can you create your own classification system that will take account of all plants and animals within your school grounds?
LC2	Can you now classify a group of animals and plants you have selected from a chosen environment?
LC3	Can you discover the special attributes that some animals and plants have to help them survive?
LC4	Why might some animals and plants be endangered and can you focus on one that you would like to carry out further research on?
LC5	What are micro-organisms and how would you classify them?
LC6	By observing artists' work can you capture images of a chosen animal?
LC7	Reflection: Take a plant or animal that you know and one that you don't know and create an IT presentation to show which group/s they belong to, etc.

Working Scientifically: devise classification systems and keys to identify some animals and plants in the immediate environment. They could research animals and plants in other habitats and decide where they belong in the classification system.

Literacy Link: LC6 provides opportunities for children to carry out individual research based on micro-organisms. They should start by coming up with a range of questions and then set their research out in sections answering their own questions.

Numeracy Link: Create different tables to show how to classify living things. Use a variety of formats to do so and consider which is the most appropriate.

Creative Art Link: LC6 provides opportunities for children to research the work of artists who have specialised in animals and plants before sketching or drawing their own.



Year 6: Could Spiderman really exist?

Year 6: Science and DT Knowledge, Skills and Understanding

Year 6 Science: Living Things and their Habitats

- Can they describe and compare the life cycles of a range of animals, including humans, amphibians, insects and birds?
- Can they talk with knowledge about birth, reproduction and death of familiar animals or plants?

- Can they take measurements using a range of scientific equipment with increasing accuracy and precision?
- Can they record more complex data and results using scientific diagrams, classification keys, labels, scattergraphs, tables, bar and line graphs?

Year 6 Challenging

- Can they observe their local environment and draw conclusions about life-cycles? (for example, the vegetable garden or flower border)
- Can they classify plants and animals in their local environment with those around the world, e.g. rainforests?

- Can they find a pattern from their data and explain what it shows?
- Can they link what they have found out to other science?
- Can they suggest how to improve their work and say why they think this?

Art & Design

- Do their sketches communicate emotions and a sense of self with accuracy and imagination?
- Can they explain why they have combined different tools to create their drawings?
- Can they explain why they have chosen specific drawing techniques?
- Can they explain what their own style is?
- Can they use a wide range of techniques in their work?
- Can they explain why they have chosen specific painting techniques?
- Do their sketch books contain detailed notes, and quotes explaining about items?
- Do they compare their methods to those of others and keep notes in their sketch books?
- Do they combine graphics and text based research of commercial design, for example magazines etc., to influence the layout of their sketch books.
- Do they adapt and refine their work to reflect its meaning and purpose, keeping notes and annotations in their sketch books?

Year 6: What would a journey through your body look like?

- **Science Y6: Animals, including humans**
- identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
- recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function
- describe the ways in which nutrients and water are transported within animals, including humans.

WOW: *Everyone will start by running around the school field and then observe what happens to their bodies*

LC1	What is pulse and why do we have one?
LC2	Why can the heart be described as the most important pump we have?
LC3	What happens to the oxygen we breathe?
LC4	Why could we describe blood as the body's river system?
LC5	What have we learnt from pioneers like William Harvey?
LC6	Can you create a picture of your face using collage?
LC7	Can you carry out a survey to show the impact of exercise on the body?
LC8	Reflection: Working as a team, in small groups, can you put together a presentation which shows the relationship between the heart, blood and breathing.

Working Scientifically: explore the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.

Literacy Link: LC5 provides opportunities for children to write a biography.

Numeracy Link: Opportunities for children to create graphs related to pulse and exercise.

Creative Art Link: Children to look at creating a self-portrait but using small pieces of coloured paper to capture accurate colour and proportion.

Year 6: What would a journey through your body look like?

Year 6: Science and Art Knowledge, Skills and Understanding

Year 6 Science: Animals, including humans

- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they make a prediction with reasons?
- Can they use test results to make further predictions and set up further comparative tests?
- Can they present a report of their findings through writing, display and presentation?
- Can they take measurements using a range of scientific equipment with increasing accuracy and precision?
- Can they record more complex data and results using scientific diagrams, labels, classification keys, tables, scatter graphs, bar and line graphs?
- Can they report findings from investigations through written explanations and conclusions?
- Can they use a graph to answer scientific questions?

- Can they identify and explain the function of the organs of the human circulatory system? (heart, blood vessels, blood)
- Can they name the major organs in the human body?
- Can they locate the major human organs?
- Can they make a diagram that outlines the main parts of a body?

Year 6 Challenging

- Can they explore the work of medical pioneers, for example, William Harvey and Galen and recognise how much we have learnt about our bodies?
- Can they compare the organ systems of humans to other animals?
- Can they make a diagram of the human body and explain how different parts work and depend on one another?

Art & Design

- Can they use paper mosaic to produce a piece of art?
- Can they combine visual and tactile qualities?
- Do they successfully use shading to create mood and feeling?
- Can they organise line, tone, shape and colour to represent figures and forms in movement?
- Can they explain why they have chosen specific materials to draw with?
- Do they keep notes in their sketch books as to how they might develop their work further?
- Do they use their sketch books to compare and discuss ideas with others?

Year 6: Have we always looked like this?

Science Y6: Evolution and Inheritance

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

WOW: *Watch an extract of Planet of the Apes and consider how realistic it could be*

LC1	Could we possibly have evolved from apes, monkeys or other primates?
LC2	What do fossils tell us about 'how things have changed'?
LC3	Who was Charles Darwin and why is he still a controversial figure?
LC4	Why do you not usually look exactly like your mum or dad?
LC5	Can you find out how animals who: live in the cold; around the equator; under the ground: and, in trees: are specifically adapted to live and survive there?
LC6	How is the human skeleton suited to our life style?
LC7	Can you create a group dance that requires you to use different balances, giving consideration to your skeletal position?
LC8	Reflection: Carry out individual research about the way humans have adapted over years that requires you to start with a range of questions.

Working Scientifically: observe and raise questions about local animals and how they are adapted to their environment; compare how some living things are adapted to survive in extreme conditions, for example cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

Literacy Link: Many opportunities to write in different ways and to use their reading skills to research a range of information. This is prominent in LC1; LC2, LC3, LC4. LC5 and LC6.

Creative Arts Link: LC4 provides opportunities for children to sketch themselves and use photographs to sketch an older member of their family. This will require detailed observation and accurate sketching.

Expressive Art Link: Plan and design a group dance that shows how the human shape and body is successfully designed to balance and move.

Year 6: Have we always looked like this?

Year 6: Science, Art and Dance Knowledge, Skills and Understanding

Year 6 Science: Evolution and Inheritance

- Can they give reasons for why living things produce offspring of the same kind?
- Can they give reasons for why offspring are not identical with each other or with their parents?
- Can they explain the process of evolution and describe the evidence for this?
- Can they begin to appreciate that variation in offspring over time can make animals more or less able to survive in particular environments?
- Can they talk about the life of Charles Darwin?

Dance

- Can they work creatively and imaginatively on their own, with a partner to compose motifs and structure simple dances?
- Can they perform to an accompaniment expressively and sensitively?
- Can they perform dances fluently and with control?
- Can they warm-up and cool-down independently?
- Do they understand how dance helps to keep them healthy?
- Do they use appropriate criteria to evaluate and refine their own and others' work?
- Do they talk about dance with understanding, using appropriate language and terminology?

Year 6 Challenging

- Can they explain how some living things adapt to survive in extreme conditions?
- Can they analyse the advantages and disadvantages of specific adaptations, such as being on two rather than four feet?
- Can they begin to understand what is meant by DNA?

Art & Design

- Do their sketches communicate emotions and a sense of self with accuracy and imagination?
- Can they explain why they have combined different tools to create their drawings?
- Can they explain why they have chosen specific drawing techniques?
- Do their sketch books contain detailed notes, and quotes explaining about items?
- Do they compare their methods to those of others and keep notes in their sketch books?
- Do they combine graphics and text based research of commercial design, for example magazines etc., to influence the layout of their sketch books.
- Do they adapt and refine their work to reflect its meaning and purpose, keeping notes and annotations in their sketch books?

Year 6: How can you light up your life?

Science Y6: Light

- recognise that light appears to travel in straight lines
- use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
- explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

WOW: *Spend time in a blacked out room and consider how the eyes adapt and why it is difficult to see anything.*

LC1	How do we know that light travels faster than sound?
LC2	How can you set up an experiment to show that light travels in straight lines?
LC3	How do your eyes work?
LC4	How can you use mirrors to see around blind corners?
LC5	Spend a small period of time being blind folded and see how successful you are at doing everyday things you take for granted?
LC6	Can you use water colour painting to create a landscape or still life painting which shows light and shadow?
LC7	Can you create a shadow puppet story and present it to others?
LC8	Reflection: Can you prepare a documentary entitled 'Let's Light it up' which shows what you have learnt in this LC.

Working Scientifically: decide where to place rear-view mirrors on cars; design and make a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets.

Literacy Link: LC1 through to LC3 provide huge opportunities to link with literacy activities**.** LC7 provides opportunities to link with play-scripts based on shadows created with a range of objects which are photographed and then set to a story.

Numeracy Link: There are opportunities to use very large numbers when considering the distance the Sun is away from the Earth and the speed at which light travels to Earth.

Possible Creative Art Link: LC3 provides additional opportunities for children to do close observational sketches of the eyes giving attention to proportion .

Creative Art Link: LC6 provides opportunities to look at the work of several famous painters, including Constable and Cezanne giving particular attention to light, tone and shadow before attempting their own work.

Year 6: How can you light up your life?

Year 6: Science and Art Knowledge, Skills and Understanding

Year 6 Science: Light

- Can they explore different ways to test an idea and choose the best way, and give reasons?
- Can they vary one factor whilst keeping the others the same in an experiment? Can they explain why they do this?
- Can they plan and carry out an investigation by controlling variables fairly and accurately?
- Can they make a prediction with reasons?
- Can they use information to help make a prediction?
- Can they use test results to make further predictions and set up further comparative tests?
- Can they explain (in simple terms) a scientific idea and what evidence supports it?
- Can they present a report of their findings through writing, display and presentation?

- Can they explain how light travels?
- Can they explain how the human eye sees objects?
- Can they explain how different colours of light can be created?
- Can they use and explain how simple optical instruments work? (periscope, telescope, binoculars, mirror, magnifying glass, Newton's first reflecting telescope)
- Can they explain changes linked to light (and sound)?

Year 6 Challenging

- Can they make a prediction which links with other scientific knowledge?
- Can they identify the key factors when planning a fair test?
- Can they explain how a scientist has used their scientific understanding plus good ideas to have a breakthrough?

- Can they use the ray model to explain the size of shadows?

Art & Design

- Do their sketches communicate emotions and a sense of self with accuracy and imagination?
- Can they explain why they have combined different tools to create their drawings?
- Can they explain why they have chosen specific drawing techniques?
- Can they explain what their own style is?
- Can they use a wide range of techniques in their work?
- Can they explain why they have chosen specific painting techniques?
- Do their sketch books contain detailed notes, and quotes explaining about items?
- Do they compare their methods to those of others and keep notes in their sketch books?
- Do they combine graphics and text based research of commercial design, for example magazines etc., to influence the layout of their sketch books.
- Do they adapt and refine their work to reflect its meaning and purpose, keeping notes and annotations in their sketch books?
- Can they make a record about the styles and qualities in their work?
- Can they say what their work is influenced by?

Year 6: Could you be the next Nintendo apprentice?

Science Y6: Electricity

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

WOW: *Look at a range of board games that require batteries and evaluate them*	
LC1	Can you create a circuit that has at least one of these features: switch; buzzer; motor?
LC2	How do traffic lights work and can you create an electrical product that needs to be sequenced?
LC3	What do you understand about: cells and volts and how it impacts on how electrical products work?
LC4	Can you set up your own company and give it an appropriate name, discuss allocation of jobs
LC5	Can you design a board game that makes use of an electric circuit and at least one of the features looked at in LC1?
LC6	How would you go about selling your product?
LC7	Reflection: Ensure your product is ready to be part of a science fair.

Working Scientifically: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Literacy Link: The main literacy link is associated with marketing their product. This includes the use of persuasive language and also involves careful planning.

Enterprise Link: This LC provides groups of children with an opportunity to organise themselves into business groups, including seeking a business loan ,etc.

Creative Art Link: The children will need to use their expertise for designing and making to create this product.

Year 6: Could you be the next Nintendo apprentice?

Year 6: Science and DT Knowledge, Skills and Understanding

Year 6 Science: Electricity

- Can they identify and name the basic parts of a simple electric series circuit? (cells, wires, bulbs, switches, buzzers, motors)
- Can they compare and give reasons for variation in how components function, including bulb brightness, buzzer volume and on/off position of switches?
- Can they explain how to make changes in a circuit?
- Can they explain the impact of changes in a circuit?
- Can they explain the effect of changing the voltage of a battery?

Year 6 Challenging

- Can they make their own traffic light system or something similar?
- Can they explain the danger of short circuits?
- Can they explain what a fuse is?

Design Technology

- Can they use a range of information to inform their design?
- Can they use market research to inform plans?
- Can they work within constraints?
- Can they follow and refine their plan if necessary?
- Can they justify their plan to someone else?
- Do they consider culture and society in their designs?
- Can they use tools and materials precisely?
- Do they change the way they are working if needed?
- How well do they test and evaluate their final product?
- Is it fit for purpose?
- What would improve it?
- Would different resources have improved their product?
- Would they need more or different information to make it even better?