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# 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.

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# Contents

# Introduction

- This book has been developed to support schools in applying the Learning Challenge principles to their teaching of Design and Technology. It is based on the aims and subject content from the 2014 National Curriculum programmes of study for Key Stages One and Two.
- The questions outlined in the examples that follow are 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. 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 suggest where children can apply knowledge, skills and understanding from other curriculum subjects where it is possible to do so.
- Finally, where a symbol  is seen, it will contain the name and author of a book recommended to be read when using the Learning Challenge. (A few of the books that have been included, especially for Key Stage 2, were written for an adult audience but they contain content that the children can access.)

# 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 are learners represented 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 represent 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 represented 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.

The examples that follow are exactly that; they are examples.

There are six suggested Learning Challenges for each year group, so one could be taught per half-term if this suits the school's overall timetable.

For each year group there is one Learning Challenge per year based on each of the following themes: Construction; Mouldable Materials; Mechanisms; Textiles; Cooking and Nutrition; and Materials.

This has been designed to aid progression and also to ensure a balance of design and technology themes over time. However, many of the requirements of the programme of study for each Key Stage will be relevant to each Learning Challenge and there is considerable overlap in skills and knowledge between the six headings used for the themes. Teachers should ensure that the children learn about the processes involved rather than concentrating only on the final product

Consider your context without losing sight of the National Curriculum coverage when making adaptations to suit your school and the needs of your pupils.

# Design and Technology: Key Stage One Overview

**Requirements from the Programme of Study**

When designing and making, pupils should be taught to:

Design
- design purposeful, functional, appealing products for themselves and other users based on design criteria
- generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology

Make
- select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
- select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics

Evaluate
- explore and evaluate a range of existing products
- evaluate their ideas and products against design criteria

Technical knowledge
- build structures, exploring how they can be made stronger, stiffer and more stable
- explore and use mechanisms [for example, levers, sliders, wheels and axles], in their products

Cooking and nutrition

As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Pupils should be taught to:
- use the basic principles of a healthy and varied diet to prepare dishes
- understand where food comes from.

# Design and Technology: Key Stage One Overview

| Learning Challenges | | | | | | |
|---|---|---|---|---|---|---|
| | **Construction** | **Mouldable Materials** | **Mechanisms** | **Textiles** | **Cooking and Nutrition** | **Materials** |
| **Year 1** | Can we design a set of chairs for The Three Bears? | What can our toys eat their dinner on? | How can we make a picture move? | Can we design a hat for Teddy to wear whatever the weather? | What could be in our fruit salad? | What else could The Three Little Pigs have made their houses from? |
| **Year 2** | Will you shake, pluck or hit your musical instrument? | Can we design our own bedroom door name signs? | Why might our monsters or dinosaurs bite you? | How can we put on a finger puppet show? | What shall we have in our sandwiches today? | How will we float our boats? |

# Design and Technology Learning Challenges

# Year 1

# Year 1: Can we design a set of chairs for The Three Bears?

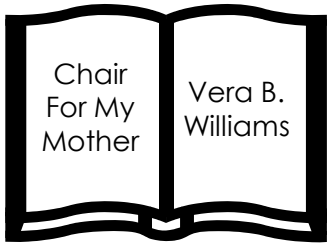
| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components, including construction materials and textiles, according to their characteristics.** | |
| WOW**: Show a slide show of pictures of as many different types of chair as possible.** | |
| LC1 | How many different kinds of chairs can we find, draw and label? |
| LC2 | What materials are used to make different chairs? |
| LC3 | What sort of chair would each of The Three Bears like and why? |
| LC3 | Can we draw our designs for chairs for each of The Three Bears? |
| LC4 | How will we measure, cut and join different junk materials? |
| LC5 | Can we use junk materials to make models of our chairs? |
| LC6 | How could we make our chairs even better? |
| Ref | Why are our chairs suitable for each of The Three Bears? |

**Literacy Links:** Links with the story of Goldilocks and The Three Bears but the children could also design furniture for other story characters and develop their vocabulary by explaining and describing their choices

**Computing Link:** Opportunities for the children to use websites to research.

**Mathematics Links:** Opportunities for the children to measure parts of chairs and compare measurements and prices.

**Art Link:** Opportunities for the children to develop their drawing skills and use of colour, including using relevant software to produce their designs.




The Learning Challenge CURRICULUM

# Can we design a set of chairs for The Three Bears?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use pictures and words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they describe how something works?<br>• Can they talk about their own work and things that other people have done? |

**Breadth of study**

- Construction
- Can they talk with others about how they want to construct their product?
- Can they select appropriate resources and tools for their building projects?
- Can they make simple plans before making objects, e.g. drawings, arranging pieces of construction before building?
- Use of materials
- Can they make a structure/model using different materials?
- Is their work tidy?
- Can they make their model stronger if it needs to be?
- Can they cut materials using scissors?
- Can they describe the materials using different words?
- Can they describe how different textiles feel?
- Can they make a product from textile by gluing?

# Year 1: What can our toys eat their dinner on?

| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials according to their characteristics.** | |
| WOW: **Set up a dinner table for the classroom dolls and toy figures but with full size plates and cups. Explain to the children that the toys need crockery the correct size for them.** | |
| LC1 | What shapes and structures can we make using air drying clay and what shapes and structures can't we make? |
| LC2 | What can we achieve with different tools? |
| LC3 | How many different crockery designs can we find and can we copy some of the designs? |
| LC4 | Can we design our own crockery sets that are the correct size for our toys? |
| LC5 | Can we make each plate, each bowl and each cup the same size and shape? |
| LC6 | How will we paint our crockery so that it looks good? |
| Ref | Can we design an advert for our crockery set? |

**Mathematics Links:** Opportunities for the children to compare objects of different sizes and use the vocabulary of shape.

**Literacy Link:** The children can write invitations to the toys inviting them to dinner.

**Literacy and Art Link:** Opportunities for the children to use persuasive language and explore the effect of colour and font, including using relevant software to produce their designs.


The Learning Challenge CURRICULUM

# What can our toys eat their dinner on?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use pictures and words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they describe how something works?<br>• Can they talk about their own work and things that other people have done? |

**Breadth of study**

**Use of materials (inc. mouldable materials)**

- 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: How can we make a picture move?

| | |
|---|---|
| **Mechanisms**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components according to their characteristics.** | |
| WOW: **Read books that include moving features with the children.** | |
| LC1 | How can we cut and join paper and card? |
| LC2 | How can we use slots in the picture to allow parts of the picture to move up and down? |
| LC3 | How can we use split pins to allow parts of the picture to go round? |
| LC4 | Which picture shall we choose and why? |
| LC5 | What parts of out picture do we want to move and how will this happen? |
| LC6 | Can we create our product so that it works? |
| Ref | Can we explain how the mechanisms we used work? |

**Link:** This Learning Challenge could be linked with any other area of the curriculum relevant to the children, with the moving picture being based on an aspect of that subject.

**Mathematics Link:** Opportunities for the children to measure and draw accurately.

**Art Link:** Opportunities for the children to draw and use other relevant art techniques and skills, including using relevant software to produce their designs.

**Literacy Link:** Opportunities for the children to develop their oracy skills and vocabulary.

The Learning Challenge CURRICULUM

# How can we make a picture move?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use pictures and words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they describe how something works?<br>• Can they talk about their own work and things that other people have done? |

**Breadth of study**

**Mechanisms**

- Can they make a product which moves?
- Can they cut materials using scissors?
- Can they describe the materials using different words?
- Can they say why they have chosen moving parts?

# Year 1: Can we design a hat for Teddy to wear whatever the weather?

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: select from and use a wide range of materials including textiles according to their characteristics** | |
| WOW: **Staff to wear clothing inappropriate for the weather conditions.** | |
| LC1 | What hats do we wear in different weather? |
| LC2 | Which textiles are different hats made from? |
| LC3 | Can we draw and label our design for a hat for Teddy for one kind of weather? |
| LC4 | Which textiles will we use and why? |
| LC5 | How can we cut our textiles to the correct size and shape? |
| LC6 | How can we join our textiles together? |
| LC7 | Does our hat fit Teddy and can we improve our product? |
| Ref | Are our clothes suitable for the weather? |

**Geography Link:** Opportunities to link with the 'Why can't a meerkat live in the North Pole?' Learning Challenge

**Art Link:** Opportunities for the children to develop and practice their drawing skills, including using relevant software to produce their designs.

**Literacy Link:** Opportunities for the children to write labels and develop vocabulary.

**Mathematics Link:** Opportunities for the children to measure and record numbers.



The Learning Challenge CURRICULUM

# Can we design a hat for Teddy to wear whatever the weather?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use pictures and words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they describe how something works?<br>• Can they talk about their own work and things that other people have done? |

**Breadth of study**

**Textiles**
- Can they describe how different textiles feel?
- Can they make a product from textiles by gluing?

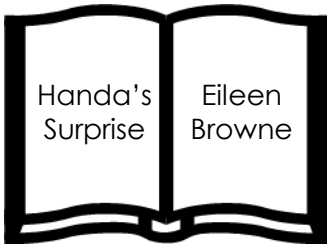
# Year 1: What could be in our fruit salad?

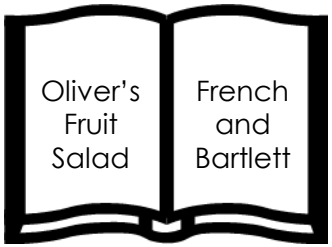
| | |
|---|---|
| **Cooking and Nutrition**<br>**Pupils should be taught to:**<br>**Use the basic principles of a healthy and varied diet to prepare dishes.**<br>**Understand where food comes from.** | |
| WOW: **Play 'Guess the Fruit' with the children identifying fruit by touch, smell and taste.** | |
| LC1 | How many different fruit can we identify? |
| LC2 | Which fruit grows in this country and which fruit grows in other countries? |
| LC3 | Why is fruit so good for us? |
| LC4 | What are the ingredients in fruit salads from a supermarket? |
| LC5 | How do we prepare different fruit so they are ready to eat? |
| LC6 | Which fruits taste the best? |
| LC7 | What will be in our fruit salad so that it tastes nice and looks good too? |
| Ref | What do other people think of our fruit salads? |

**Geography Link:** Opportunities for the children to find and name places on maps and compare geographical features including climate.

**Mathematics Link:** Children can compare prices and calculate with money.

**Oracy Links:** Opportunities for children to develop their vocabulary, ask questions and use comparative language.




The Learning Challenge CURRICULUM

# What could be in our fruit salad?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they talk about their own work and things that other people have done? |

### Breadth of study

**Cooking and nutrition**

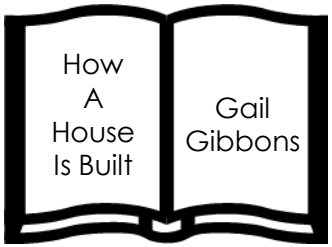
- Can they cut food safely?
- Can they describe the texture of foods?
- Do they wash their hands and make sure that surfaces are clean?
- Can they think of interesting ways of decorating food they have made, eg, cakes?

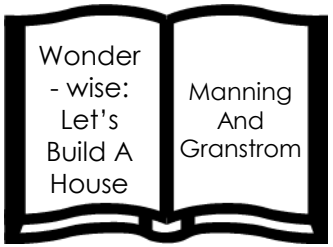
# Year 1: What else could The Three Little Pigs have made their houses from?

| | |
|---|---|
| **Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components according to their characteristics.** | |
| WOW: **Linked to the story, test 'houses' built by the teachers by using an office fan.** | |
| LC1 | What other materials could we use to build a house for a Little Pig? |
| LC2 | Can we draw and label the designs for our houses? |
| LC3 | How will we cut and join our materials? |
| LC4 | Can we make houses that are strong enough to stand up when we turn a fan on? |
| LC5 | How could we improve our designs? |
| LC6 | How can we decorate our houses so the Little Pigs will want to live there? |
| Ref | Can we explain which material made the strongest house? |

**Oracy Links:** Opportunities for the children to develop their vocabulary and describe the properties of materials.

**Art Links:** Opportunities for the children to develop and practice their drawing and painting skills, including using relevant software to produce their designs.




The Learning Challenge CURRICULUM

# What else could The Three Little Pigs have made their houses from?

## Year 1

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of some ideas of their own?<br>• Can they explain what they want to do?<br>• Can they use pictures and words to plan? | • Can they explain what they are making?<br>• Can they explain which tools they are using? | • Can they describe how something works?<br>• Can they talk about their own work and things that other people have done? |

### Breadth of study

**Use of materials**

- Can they make a structure/model using different materials?
- Is their work tidy?
- Can they make their model stronger if it needs to be?

# Design and Technology Learning Challenges

# Year 2

# Year 2: Will you shake, pluck or hit your musical instrument?

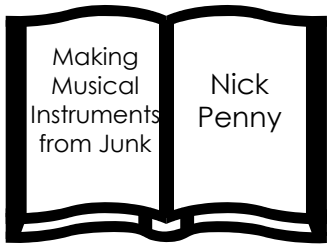
| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components, including construction materials and textiles, according to their characteristics.** | |
| WOW: **Show the children a hand-made musical instrument and arrange for a demonstration of it being played.** | |
| LC1 | What materials are the musical instruments in school made from and how are they played? |
| LC2 | What materials do we have available to make our own instruments? |
| LC3 | Can we draw designs for more than one instrument and then choose which design to make? |
| LC4 | How will we cut and join the materials we are using? |
| LC5 | How can we finish our instrument so it looks good and then decorate it? |
| Ref | Can we accompany music with our instrument? |

**Music Links:** Opportunities for the children to link this Learning Challenge with any instrumental and compositional work.

**Oracy Link:** Opportunities for the children to develop their descriptive vocabulary and compare features of instruments.

**Art Link:** Opportunities for the children to develop their drawing skills, including using relevant software to produce their designs.

**Mathematics Link:** Opportunities for the children to measure dimensions of their designs and product.





The Learning Challenge CURRICULUM

# Will you shake, pluck or hit your musical instrument?

## Year 2

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• 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?<br>• If they did it again, what would they want to improve? |

**Breadth of study**

- Can they develop their own ideas from initial starting points?
- Can they join materials together as part of a moving product?
- Can they add some kind of design to their product?
- Can they measure materials to use in a model or structure?
- Can they join material in different ways?
- Can they use joining, folding or rolling to make it stronger?

# Year 2: Can we design our own bedroom door name signs?

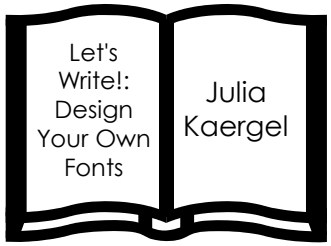
| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials according to their characteristics.** | |
| WOW**: Show the children different bedroom door name signs made of individual letters.** | |
| LC1 | How can we make salt dough? |
| LC2 | What fonts do we like and can we design prototype signs using different fonts? |
| LC3 | Can we design our own font that can be made from salt dough? |
| LC4 | How will we make sure the letters we make are the same size? |
| LC5 | Can we decorate our letters so they look good and look part of the same design? |
| LC6 | How will our letters attach to a door? |
| Ref | How will we report how our bedroom door name sign looks when it is in place? |

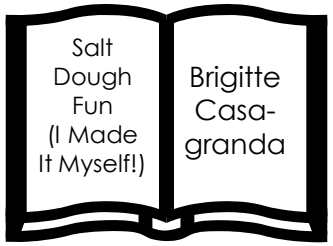
**Art Links:** Opportunities for the children to develop their drawing skills, including using relevant software to produce their designs.

**Mathematics Link:** Opportunities for the children to measure length.

**Art Link:** Opportunities for children to explore the effects of colour and pattern.

**Literacy Link:** Opportunities for children to report orally or in writing.




The Learning Challenge CURRICULUM

# Can we design our own bedroom door name signs?

## Year 2

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• 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?<br>• If they did it again, what would they want to improve? |

**Breadth of study**

**Use of materials**

- Can they measure materials to use in a model or structure?
- Can they join material in different ways?
- Can they use joining, folding or rolling to make it stronger?

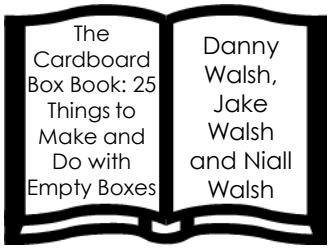
# Year 2: Why might our monsters or dinosaurs bite you?

| | |
|---|---|
| **Mechanisms**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components according to their characteristics.** | |
| WOW: **Watch film clips of moving cardboard models.** | |
| LC1 | What is a lever and a cam and can we practice making them using construction kits? |
| LC2 | What tools and materials can we use to cut and join cardboard? |
| LC3 | How can we make a monster or dinosaur out of cardboard and cardboard boxes? |
| LC4 | Can we make parts of our monster or dinosaur move? |
| LC5 | Could we improve our monster or dinosaur to make it even more ferocious? |
| LC6 | How can we colour or decorate our model and make sure the moving parts still operate? |
| Ref | Can we explain how our monster or dinosaur can bite? |

**Mathematics Links:** Opportunities for the children to measure, compare sizes and develop their knowledge of shapes.

**Art Link:** The children can paint or decorate their model using collage techniques to represent scales.

**Literacy Link:** Opportunities for the children to talk and present their work to an audience.


The Learning Challenge CURRICULUM

# Why might our monsters or dinosaurs bite you?

## Year 2

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• 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?<br>• If they did it again, what would they want to improve? |

**Breadth of study**

**Mechanisms**

- Can they join materials together as part of a moving product?
- Can they add some kind of design to their product?

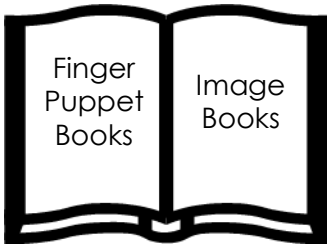
# Year 2: How can we put on a finger puppet show?

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: select from and use a wide range of materials including textiles according to their characteristics** | |
| WOW: **Watch an old episode of 'Fingerbobs' or 'Fingermouse'** | |
| LC1 | What makes a good finger puppet? |
| LC2 | What will our own finger puppets look like? |
| LC3 | Which textiles will we use and why? |
| LC4 | How can we cut our textiles to the correct size and shape? |
| LC5 | Which materials can we use to make the features of our puppets? |
| LC6 | How can we join our textiles and other materials together? |
| LC7 | How do we know our finger puppets work? |
| Ref | Can we use our finger puppets to tell a story? |

**Art Link:** Opportunities for the children to learn and practice drawing skills and techniques during the design stage, including using relevant software to produce their designs.

**Mathematics Link:** Opportunities for the children to measure accurately.

**Literacy Link:** Opportunities to retell stories and develop vocabulary.





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# How can we put on a finger puppet show?

## Year 2

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• 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?<br>• If they did it again, what would they want to improve? |

### Breadth of study

**Textiles**

- Can they measure textile?
- Can they join textiles together to make something?
- Can they cut textiles?
- Can they explain why they chose a certain textile?

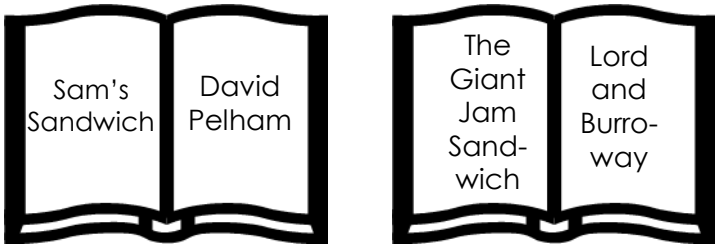
# Year 2: What shall we have in our sandwiches today?

| | |
|---|---|
| **Cooking and Nutrition**<br>**Pupils should be taught to:**<br>**Use the basic principles of a healthy and varied diet to prepare dishes.**<br>**Understand where food comes from.** | |
| WOW: **Arrange a visit to a sandwich shop.** | |
| LC1 | How is bread made? |
| LC2 | Which types of bread could we use to make a sandwich? |
| LC3 | Where do our favourite sandwich ingredients come from? |
| LC4 | How do they make butter, mayonnaise and sandwich spread? |
| LC5 | How should we prepare ingredients for our sandwiches? |
| LC6 | Can we make our own sandwich filling? |
| Ref | Which ingredients will we use to make a really healthy sandwich? |

**Oracy Link:** The children can describe and contrast the look, flavour and texture of different types of bread.

**Geography Link:** Opportunities for the children to use maps to locate places and follow transport routes.

**Literacy Links:** Opportunities for children to write recipes and reports.




The Learning Challenge CURRICULUM

# What shall we have in our sandwiches today?

## Year 2

| Developing, planning and communicating ideas | Evaluating processes and products |
|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• Can they describe their design by using pictures and words? | • What went well with their work?<br>• If they did it again, what would they want to improve? |

### Breadth of study

**Cooking and nutrition**

- Can they describe the properties of the ingredients they are using?
- Can they explain what it means to be hygienic?
- Are they hygienic in the kitchen?

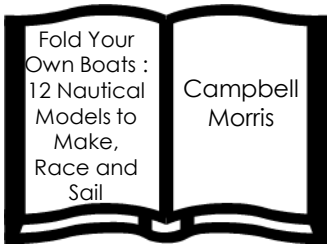
# Year 2: How will we float our boats?

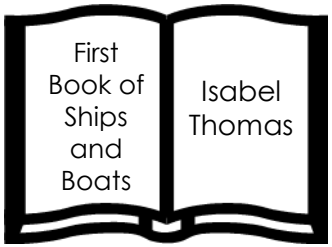
| | |
|---|---|
| **Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wide range of materials and components according to their characteristics.** | |
| WOW: **Show the children a model boat or play with model boats.** | |
| LC1 | What materials are real boats made from? |
| LC2 | What materials could we use to make the hull of our model boats? |
| LC3 | How will we keep our boats upright in the water? |
| LC4 | Can we design a mast and sail and what materials could we use to make them? |
| LC5 | Do our finished boats work and how can we improve them? |
| Ref | Which materials are best for each part of our boats and why? |

**Literacy Link:** Opportunities for the children to research from books and online and write reports or feedback their findings orally.

**Art Link:** Opportunities for the children to develop their drawing skills, including using relevant software to produce their designs.

**Science Link:** Opportunities for the children to discuss properties of materials and testing.




The Learning Challenge CURRICULUM

# How will we float our boats?

## Year 2

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they think of ideas and plan what to do next?<br>• Can they choose the best tools and materials? Can they give a reason why these are best?<br>• 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?<br>• If they did it again, what would they want to improve? |

### Breadth of study

**Use of materials**

- Can they measure materials to use in a model or structure?
- Can they join material in different ways?
- Can they use joining, folding or rolling to make it stronger?

# Design and Technology: Key Stage Two Overview

**Requirements from the Programme of Study**

When designing and making, pupils should be taught to:

Design
- use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups
- generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.

Make
- select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
- select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities.

Evaluate
- investigate and analyse a range of existing products
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- understand how key events and individuals in design and technology have helped shape the world.

Technical knowledge
- apply their understanding of how to strengthen, stiffen and reinforce more complex structures
- understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
- understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
- apply their understanding of computing to program, monitor and control their products.

# Design and Technology: Key Stage Two Overview

**Requirements from the Programme of Study**

As part of their work with food, pupils should be taught how to cook and apply the principles of nutrition and healthy eating. Pupils should be taught to:

Cooking and nutrition

- understand and apply the principles of a healthy and varied diet
- prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques
- understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.

# Design and Technology: Key Stage Two Overview

| Learning Challenges | | | | | | |
|---|---|---|---|---|---|---|
| | **Construction** | **Mouldable Materials** | **Mechanisms** | **Textiles** | **Cooking and Nutrition** | **Materials** |
| **Year 3** | How will we bridge that gap? | How can we design and make a small jewellery container? | How interactive can we make our book? | How comfy is that cushion? | What would my dinner be back in time? | How can we help an egg survive the journey home from the shops? |
| **Year 4** | Can we all go and fly a kite? | How will our tiles stay on the roof? | How can we catch a thief? | Will our 'Bag for Life' last that long? | What is your favourite kind of pizza? | How will we take our pizza home? |
| **Year 5** | Why would birds hatch their eggs here? | What would that map look like in 3D? | How will that boat fit under that bridge? | How handy are our gloves? | Who will win the Great Year 5 Bread Bake-Off? | How far will our model plane fly? |
| **Year 6** | How can we help keep a cat fit and healthy? | Where can we grow our strawberry plants? | Will our model theatre be ready for opening night? | Can we design and make a soft toy for a younger family member? | Can we grow our own salad? | How can we shelter from the storm? |

# Design and Technology Learning Challenges

# Year 3

# Year 3: How will we bridge that gap?

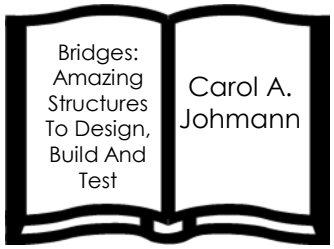
| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Apply their understanding of how to strengthen, stiffen and reinforce more complex structures** | |
| WOW: **Watch a film clip of the construction of different bridges around the world.** | |
| LC1 | How many types of bridges can we investigate? |
| LC2 | Can we copy different bridge structures using construction kits? |
| LC3 | Which shapes do engineers use for their strength? |
| LC4 | Can we design a bridge made of card, paper and string to span a gap between two tables? |
| LC5 | If we have a limited budget to 'buy' card, paper and string can we modify our designs and what will we choose to build our model bridge? |
| LC6 | How will we cut and join the materials we are using? |
| LC7 | How will we test our bridge? |
| LC8 | What type of bridge was most successful and why? |
| Ref | How could we improve our designs? |

**Geography Link:** Opportunities for the children to research the location of famous bridges in this country and around the world and also learn about transport routes.

**History Links:** The children can learn about bridge builders and engineers.

**Mathematics Link:** Opportunities to calculate with money.

**Mathematics Links:** Opportunities for the children to use units of measurement for length, weight and time.

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# How will we bridge that gap?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Stiff and flexible sheet materials**

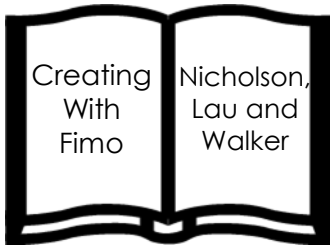
- Do they use the most appropriate materials?
- Can they work accurately to make cuts and holes?
- Can they join materials?

# Year 3: How can we design and make a small jewellery container?

| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials according to their functional properties and aesthetic qualities** | |
| WOW**: Ask for the children's help in sorting a pile of assorted jewellery and have some pieces deliberately missing from pairs of earrings, etc.** | |
| LC1 | What jewellery boxes and containers are available to buy and what are their features? |
| LC2 | What tools and techniques can we use when we are making a product out of coloured modelling clay? |
| LC3 | How will we incorporate compartments and a lid? |
| LC4 | Can we draw our designs first and include measurements? |
| LC5 | How will we make our container look great? |
| Ref | Does our jewellery box compare well against those you can buy? |

**Literacy Link:** Opportunities for the children to research from catalogues and websites.

**Mathematics Link:** Opportunities for the children to measure and calculate area and volume.

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# How can we design and make a small jewellery container?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Mouldable materials**
- Do they select the most appropriate materials?
- Can they use a range of techniques to shape and mould?
- Do they use finishing techniques?

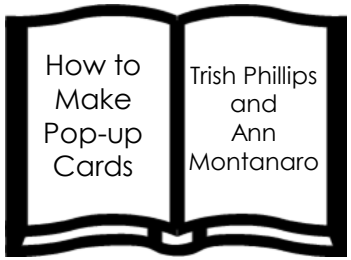
# Year 3: How interactive can we make our book?

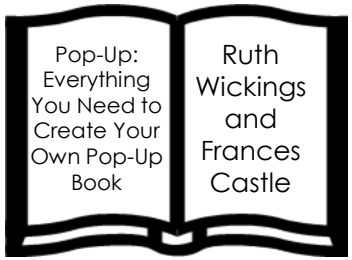
| | |
|---|---|
| **<u>Mechanisms: Electrical and Mechanical Components</u>**<br>**When designing and making, pupils should be taught to:**<br>**Select from and use a wider range of materials and components.** | |
| WOW**: Give the children access to a range of interactive books for younger children, including pop-up books and books that make noises when buttons are pressed.** | |
| LC1 | What techniques can we learn for making pop-up books? |
| LC2 | Can we build prototypes to test ways of making pop-up features? |
| LC3 | What pop-up features will we include in our own book for younger children in our school? |
| LC4 | Can we include any features that use electrical circuits and switches? |
| LC5 | How will we make our books robust enough for younger children to use? |
| LC6 | Do our front cover and our illustrations suit the audience for our book and are they of high quality? |
| Ref | What do the younger children think of our products? |

**Literacy Link:** The children can write their own stories for younger children that can then be made into their interactive books.

**Literacy Link:** Opportunities for the children to discuss what they have learned and share ideas verbally or in written form.

**Science Link:** Opportunities for the children to use circuits and batteries.

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# How interactive can we make our book?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Electrical and mechanical components**

- Do they select the most appropriate tools and techniques to use for a given task?
- Can they make a product which uses both electrical and mechanical components?
- Can they use a simple circuit?
- Can they use a number of components?

# Year 3: How comfy is that cushion?

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Visit a home furnishing shop or their website or catalogue.** | |
| LC1 | What makes a good cushion that people will want to buy for their home? |
| LC2 | Which fabrics could we use? |
| LC3 | What sewing techniques will we use? |
| LC4 | How will we make our cushion look attractive? |
| LC5 | Which of our designs will we choose to make? |
| LC6 | Can we design a template for our cushion and its decoration? |
| LC7 | Can we make our cushion to a high standard, using the techniques we have learned? |
| Ref | Does our cushion appeal to other people and how could we improve it? |

**Literacy Link:** Children can explain and justify their opinions and plan questions to interview other people.

**Art Link:** Opportunities for the children to explore the impact of pattern, colour and contrast, including using relevant software to produce their designs.



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# How comfy is that cushion?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Textiles**
- Can they join textiles of different types in different ways?
- Can they choose textiles both for their appearance and also qualities?

# Year 3: What would my dinner be back in time?*

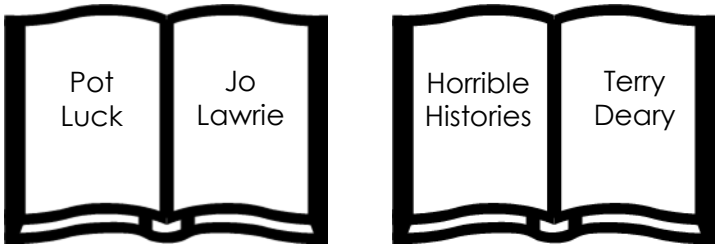
***This unit links with whichever historical period the children are studying**

| | |
|---|---|
| **Cooking and Nutrition**<br>**Pupils should be taught to:**<br>**Understand and apply the principles of a healthy and varied diet**<br>**Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques**<br>**Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.** | |
| WOW: **Show a film clip of food preparation from the appropriate historical period.** | |
| LC1 | What was a typical weekly menu? |
| LC2 | Where did the ingredients come from? |
| LC3 | How were the ingredients prepared and what tools were used? |
| LC4 | Can we write a recipe for a meal from that time? |
| LC5 | Can we prepare food as people did in the past? |
| LC6 | How will we cook our food and how was it cooked in the past? |
| Ref | Was our diet healthier now or then and why? |

**Literacy Link:** Opportunities for the children to research and report their findings.

**Geography Link:** Children could use maps to find locations and follow trade routes.

**Literacy Link:** Children can write their recipes as instructions

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# What would my dinner be back in time?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Cooking and nutrition**

- Can they choose the right ingredients for a product?
- Can they use equipment safely?
- Can they make sure that their product looks attractive?
- Can they describe how their combined ingredients come together?
- Can they set out to grow plants such as cress and herbs from seed with the intention of using them for their food product?

# Year 3: How can we help an egg survive the journey home from the shops?

| | |
|---|---|
| **Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities** | |
| WOW: **Show the class a box of broken eggs from a teacher's shopping and explain we need the children to help design a better version.** | |
| LC1 | What are egg boxes made of and why? |
| LC2 | Can we design a test to find out which is the best egg box or egg carrier? |
| LC3 | What materials could we use to make an even better egg box or carrier? |
| LC4 | Can we develop two or three design ideas and then choose one to make? |
| LC5 | How will we cut and join our chosen materials? |
| LC6 | How will we decorate our product to make it appealing to customers? |
| Ref | Is our egg box or carrier better than a shop bought egg box? |

**Science Link:** Opportunities for the children to develop fair testing.

**Literacy Link:** Opportunities for the children to explain and justify their ideas and develop comparative vocabulary.

**Art Link:** Opportunities for the children to research designs and explore the impact of colour, font and pattern.

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# How can we help an egg survive the journey home from the shops?

## Year 3

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they show that their design meets a range of requirements?<br>• Can they put together a step-by-step plan which shows the order and also what equipment and tools they need?<br>• Can they describe their design using an accurately labelled sketch and words?<br>• How realistic is their plan? | • Can they use equipment and tools accurately? | • What did they change which made their design even better? |

**Breadth of study**

**Stiff and flexible sheet materials**
- Do they use the most appropriate materials?
- Can they work accurately to make cuts and holes?
- Can they join materials?

# Design and Technology Learning Challenges

# Year 4

# Year 4: Can we all go and fly a kite?

| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW: **Go and fly a kite with the children.** | |
| LC1 | What kinds of kite are there and what materials are they made from? |
| LC2 | What are the design criteria for a kite? |
| LC3 | What kind of kite will we design and why? |
| LC4 | What materials will we need and how will we cut and join them? |
| LC5 | Can we construct our kite so it is strong, light and looks good too? |
| LC6 | Is a tail on a kite really necessary? |
| Ref | Did our kite work and what could we do to improve it? |

**Literacy Link:** Opportunities for the children to research and present their findings.

**Art Links:** Opportunities for the children to produce art work based on kites and to design patterns for their own products.

**Mathematics Link:** Opportunities for the children to measure and use angles.

**Mathematics Link:** The children could work within a budget and calculate the cost of materials.


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# Can we all go and fly a kite?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they come up with at least one idea about how to create their product?<br>• Do they take account of the ideas of others when designing?<br>• Can they produce a plan and explain it to others?<br>• 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?<br>• Are they conscious of the need to produce something that will be liked by others?<br>• 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?<br>• Can they begin to explain how they can improve their original design?<br>• Can they evaluate their product, thinking of both appearance and the way it works? |

**Breadth of study**

- Have they thought about how to make their product strong?
- Can they devise a template?
- Can they explain how to join things in a different way?
- Have they thought what they can do to present their product in an interesting way?
- Can they measure carefully so as to make sure they have not made mistakes?
- How have they attempted to make their product strong?

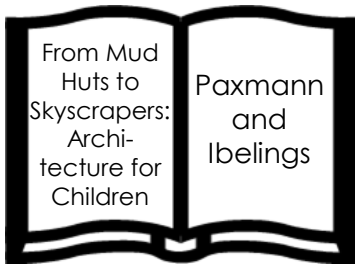
# Year 4: How will our tiles stay on the roof?

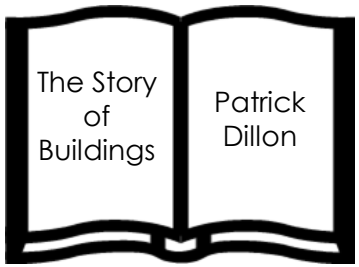
| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials according to their functional properties and aesthetic qualities.** | |
| WOW: **Arrange a visit from a builder or roofer.** | |
| LC1 | What materials are used for making roofs? |
| LC2 | How are tiles manufactured? |
| LC3 | How do tiles fit together and stay on the roof? |
| LC4 | Can we design our own clay tiles and make prototypes to test how they will fit together? |
| LC5 | Will our tiles allow water to drain from the roof and look good on a house? |
| LC6 | How will we make sure each of our clay tiles is exactly the same size and shape? |
| Ref | Will our tiles cover a sloping area like a roof and stay in place? |

**History Link:** This Learning Challenge could link with the study of the Romans.

**Geography Link:** Opportunities to learn about architecture, roof materials and tile design in other locations.

**Mathematics Links:** Opportunities for the children to measure accurately and calculate the quantity of tiles required to cover a given area.

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# How will our tiles stay on the roof?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they come up with at least one idea about how to create their product?<br>• Do they take account of the ideas of others when designing?<br>• Can they produce a plan and explain it to others?<br>• 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?<br>• Are they conscious of the need to produce something that will be liked by others?<br>• 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?<br>• Can they begin to explain how they can improve their original design?<br>• Can they evaluate their product, thinking of both appearance and the way it works? |

**Breadth of study**

**Mouldable materials**

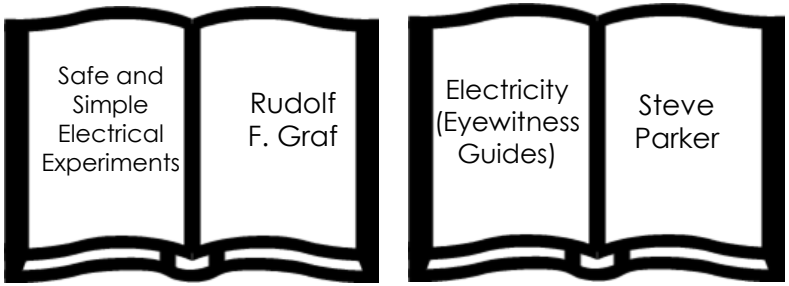
- Do they take time to consider how they could have made their idea better?
- Do they work at their product even though their original idea might not have worked?

# Year 4: How can we catch a thief?

| | |
|---|---|
| **<u>Mechanisms: Electrical and Mechanical Components</u>**<br>**When designing and making, pupils should be taught to:**<br>**Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Set the classroom up as a crime scene with a computer or expensive item missing.** | |
| LC1 | How does the school burglar alarm work? |
| LC2 | How can we construct a circuit that includes a buzzer and a light? |
| LC3 | Can we design switches for a circuit that will fit on a window? |
| LC4 | Can we design switches that work as pressure pads on the floor? |
| LC5 | How will we improve our alarm systems after we have tested them? |
| LC6 | How will we hide the mechanisms but also warn people that the room is alarmed? |
| LC7 | How will we market our burglar alarm products? |
| Ref | Will our alarms help us to catch a member of our class or a teacher who pretends to be a thief? |

**Science Links:** Opportunities for the children to apply their scientific knowledge in a practical context.

**Art and Literacy Links:** Opportunities for the children to use language, colour, font and pattern to influence an audience, including using relevant software to produce their designs.




The Learning Challenge CURRICULUM

# How can we catch a thief?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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| • Can they come up with at least one idea about how to create their product?<br>• Do they take account of the ideas of others when designing?<br>• Can they produce a plan and explain it to others?<br>• 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?<br>• Are they conscious of the need to produce something that will be liked by others?<br>• 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?<br>• Can they begin to explain how they can improve their original design?<br>• Can they evaluate their product, thinking of both appearance and the way it works? |

**Breadth of study**

**Electrical and mechanical components**

- Can they add things to their circuits?
- How have they altered their product after checking it?
- Are they confident about trying out new and different ideas?

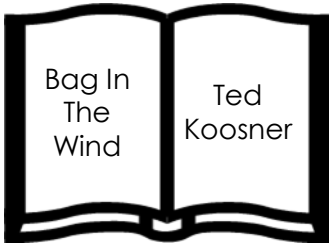
# Year 4: Will our 'Bag for Life' last that long?

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Test basic shopping bags to breaking point or show a film clip about the number of plastic bags that are thrown away.** | |
| LC1 | What materials are used to make shopping bags and which are best? |
| LC2 | Which textiles are used to make fabric shopping bags? |
| LC3 | How are both the fabric and the handles joined together to ensure strength? |
| LC4 | Can we design our own bag for life and what textiles will we use? |
| LC5 | What pattern or motif will help make our bag attractive to users? |
| LC6 | What techniques will we use to assemble our bag? |
| Ref | How will we evaluate our bag? |

**Literacy Link:** Opportunities for the children to research and report their findings in written or verbal form.

**Art Link:** Opportunities for the children to develop their use of colour, contrast and form, including using relevant software to produce their designs.

**Literacy Link:** Children can discuss, question each other and justify their choices.

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# Will our 'Bag for Life' last that long?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they come up with at least one idea about how to create their product?<br>• Do they take account of the ideas of others when designing?<br>• Can they produce a plan and explain it to others?<br>• 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?<br>• Are they conscious of the need to produce something that will be liked by others?<br>• 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?<br>• Can they begin to explain how they can improve their original design?<br>• Can they evaluate their product, thinking of both appearance and the way it works? |

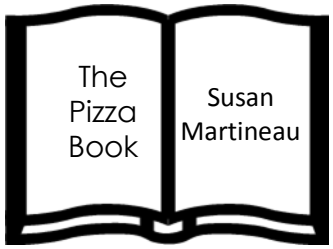
**Breadth of study**

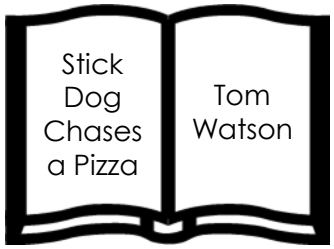
**Textiles**
- Do they think what the user would want when choosing textiles?
- Have they thought about how to make their product strong?
- Can they devise a template?
- Can they explain how to join things in a different way?

# Year 4: What is your favourite kind of pizza?

| | |
|---|---|
| **Cooking and Nutrition**<br>**Pupils should be taught to:**<br>**Understand and apply the principles of a healthy and varied diet**<br>**Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques**<br>**Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.** | |
| WOW**: Watch an advert for pizza and discuss what makes you want to buy it.** | |
| LC1 | What different types of pizza are available and what ingredients do they use? |
| LC2 | How can we make the dough for the base of a pizza? |
| LC3 | Which recipe for the base tomato sauce will we use? |
| LC4 | Which pizza toppings could we add and how are they prepared? |
| LC5 | How healthy is a pizza? |
| LC6 | How will we make sure our pizza looks good as well as tastes good? |
| Ref | What will we include on our pizza as toppings and what will we call our pizza? |

**Literacy Links:** Opportunities for the children to research and report their findings.

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# What is your favourite kind of pizza?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Cooking and nutrition**
- 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?

# Year 4: How will we take our pizza home?

| | |
|---|---|
| **Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials according to their functional properties and aesthetic qualities** | |
| WOW: **Evaluate a wide range of food packaging.** | |
| LC1 | How are pizza boxes constructed? |
| LC2 | How can we score card to ensure the folds are straight? |
| LC3 | Can we design a net for our pizza box? |
| LC4 | Why is the little plastic table important inside large pizza boxes and how will we make one? |
| LC5 | What will our logo look like and will it attract customers? |
| LC6 | Can we design a pizza box for one slice of pizza? |
| Ref | Did our pizza arrive home safely and how could we improve our design? |

**Mathematics Link:** Opportunities for the children to measure accurately and explore the properties of shapes and angles.

**Art Link:** Opportunities for the children to research logos and graphic design.

**Literacy Link:** Opportunities for the children to report verbally or in written form.

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# How will we take our pizza home?

## Year 4

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they come up with at least one idea about how to create their product?<br>• Do they take account of the ideas of others when designing?<br>• Can they produce a plan and explain it to others?<br>• 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?<br>• Are they conscious of the need to produce something that will be liked by others?<br>• 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?<br>• Can they begin to explain how they can improve their original design?<br>• Can they evaluate their product, thinking of both appearance and the way it works? |

**Breadth of study**

**Stiff and flexible sheet materials**
- Can they measure carefully so as to make sure they have not made mistakes?
- How have they attempted to make their product strong?

# Design and Technology Learning Challenges

# Year 5

# Year 5: Why would birds hatch their eggs here?

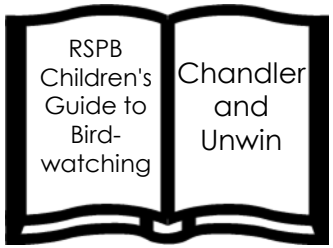
| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Show film clips from a nest box camera.** | |
| LC1 | What kind of birds live in or visit our school grounds? |
| LC2 | What do the species of birds that might nest here need? |
| LC3 | Can we design a box that meets the needs of species of local birds? |
| LC4 | How will we cut and join the materials? |
| LC5 | How will our design be stable and weather-proof? |
| LC6 | How will we securely attach our nest box to a tree, post, wall or fence? |
| Ref | Can we produce instructions and plans so other people can make our nest box? |

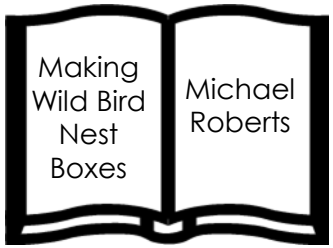
**Literacy and Mathematics Links:** Opportunities for children to research local data and books about bird habitats.

**Geography Link:** Opportunities for children to compare climates and physical features of habitats.

**Mathematics Link:** Opportunities for pupils to include precise measurements and draw shapes accurately.

**Literacy Link:** Opportunities for pupils to write for an audience.




The Learning Challenge CURRICULUM

# Why would birds hatch their eggs here?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they come up with a range of ideas after they have collected information?<br>• Do they take a user's view into account when designing?<br>• Can they produce a detailed step-by-step plan?<br>• 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?<br>• Can they explain how their product will appeal to the audience?<br>• Can they use a range of tools and equipment expertly? | • Do they keep checking that their design is the best it can be?<br>• Do they check whether anything could be improved?<br>• Can they evaluate appearance and function against the original criteria? |

**Breadth of study**

- Are their measurements accurate enough to ensure that everything is precise?
- Can they use a range of joining techniques?
- How have they ensured that their product is strong and fit for purpose?

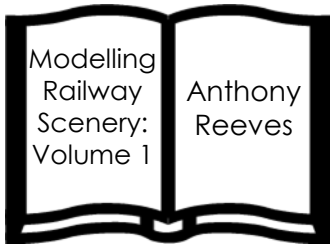
# Year 5: What would that map look like in 3D?

| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials according to their functional properties and aesthetic qualities.** | |
| WOW: **Look at models of landscapes e.g. from model railways or planning applications.** | |
| LC1 | Can we describe the terrain and physical features on an ordnance survey map? |
| LC2 | How can we make our own papier mache to the correct consistency to make a landscape model? |
| LC3 | What do landscape model makers use to support the shape they are making and what could we learn from this? |
| LC3 | Can we plan our 3D landscape model so it will be an accurate copy of the place we are studying? |
| LC4 | How will we evaluate our final 3D model? |
| LC5 | Can we add detail to our landscape so it matches the actual place? |
| Ref | Is our landscape recognisable and how could it be improved? |

**Geography or History Links:** This whole Learning Challenge could link with the study of a specific location or an area of settlement from a historic period.

**Mathematical Link:** Opportunities for pupils to measure and calculate relative differences in distance and the height of features.

**Computing Link:** Opportunities for pupils to use Google Earth to compare their model with the actual location.





The Learning Challenge CURRICULUM

# What would that map look like in 3D?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
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**Breadth of study**

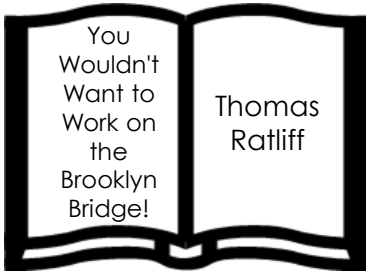
**Mouldable materials**
- Are they motivated enough to refine and improve their product?
- Do they persevere through different stages of the making process?

# Year 5: How will that boat fit under that bridge?

| | |
|---|---|
| **<u>Mechanisms: Electrical and Mechanical Components</u>**<br>**When designing and making, pupils should be taught to:**<br>**Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Visit or watch a bascule bridge or swing bridge in operation.** | |
| LC1 | What do we already know about bridge construction?<br>*(from Year 3 Learning Challenge)* |
| LC2 | Why do we have bascule bridges and swing bridges and how do they work? |
| LC3 | How can we make a prototype model bridge leaf raise and lower using mechanisms? |
| LC4 | How can we make a prototype model bridge leaf swing back and forth using mechanisms? |
| LC5 | Can we incorporate mechanisms into a finished working model of a double leaf bascule or swing bridge? |
| Ref | How will we evaluate our bridge designs and models? |

**Geography Link:** Opportunities for the children to locate examples of these bridges in this country and other countries.

**Science Links:** Opportunities for the children to discuss the forces that are acting on parts of their bridges and mechanisms.

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# How will that boat fit under that bridge?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Electrical and mechanical components**
- Can they incorporate a switch into their product?
- Can they refine their product after testing it?
- Can they incorporate hydraulics and pneumatics?

# Year 5: How handy are our gloves?

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Staff to wear a range of gloves e.g. boxing, cricket, latex, cycling, mittens and discuss purposes with children.** | |
| LC1 | How many types of gloves can we find and what are their uses? |
| LC2 | Which textiles are used to make different gloves and why? |
| LC3 | What kind of gloves shall we design? |
| LC4 | What textiles will we use so that our gloves are 'fit for purpose'? |
| LC5 | Why might a prototype be useful? |
| LC6 | What colours or patterns will we incorporate into our design to make our gloves look good as well as function well? |
| LC7 | What techniques will we use to assemble our gloves? |
| Ref | Do our gloves do the job? |

**Literacy Link:** Opportunities for the children to research and report their findings in written or verbal form.

**Art Link:** Opportunities for the children to develop their use of colour, contrast and form, including using relevant software to produce their designs.

**Literacy Link:** Children can discuss, question each other and justify their decisions

The Learning Challenge CURRICULUM

# How handy are our gloves?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Textiles**
- Do they think what the user would want when choosing textiles?
- How have they made their product attractive and strong?
- Can they make up a prototype first?
- Can they use a range of joining techniques?

# Year 5: Who will win the Great Year 5 Bread Bake-Off?

**Cooking and Nutrition**
**Pupils should be taught to:**
**Understand and apply the principles of a healthy and varied diet**
**Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques**
**Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.**

WOW: **Watch a clip of a cookery programme as chefs discuss bread making.**

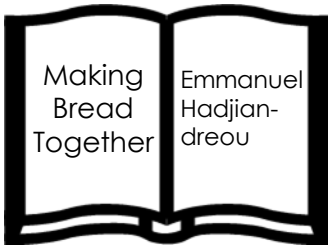
| | |
|---|---|
| LC1 | What are the main ingredients in bread and how are they produced? |
| LC2 | How are different types of bread made around the world? |
| LC3 | What cookery techniques will we use and why are they important? |
| LC4 | Which recipes will we choose to bake and why? |
| LC5 | How will we evaluate our bread? |
| Ref | What do other people think of our bread and would it win the Bake-Off? |

**Geography Link:** Opportunities to link with map work and knowledge of locations.

**Science Link:** Opportunities to discuss changes in state and gases.

**Mathematics Link:** The children can calculate the total cost of ingredients.

**Literacy Links:** Opportunities for the children to discuss, justify, interview and write a report.

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# Who will win the Great Year 5 Bread Bake-Off?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Cooking and nutrition**
- Can they describe what they do to be both hygienic and safe?
- How have they presented their product well?

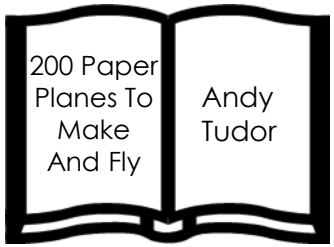
# Year 5: How far will our model plane fly?

| | |
|---|---|
| **Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including construction materials according to their functional properties.** | |
| WOW: **Play clips of contestants taking part in pier flying competitions or arrange a visit from an owner of a model radio controlled plane.** | |
| LC1 | How many designs for paper planes can we research and which fly the furthest? |
| LC2 | Will we design a model glider or a model elastic band powered plane? |
| LC3 | What materials will be best to use and why? |
| LC4 | How will we join our materials and still ensure our plane is light and aerodynamic? |
| LC5 | What techniques will we use during construction? |
| LC6 | What modifications will improve the performance of our plane? |
| Ref | How will we test our designs? |

**History Link:** Opportunities for the children to learn about the history of flight and significant individuals during this Learning Challenge.

**Literacy Link:** Opportunities for the children to research and record their findings.

**Mathematics Link:** Opportunities for the children to measure accurately and use the language of shape and angles.





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# How far will our model plane fly?

## Year 5

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
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**Breadth of study**

**Stiff and flexible sheet 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?

# Design and Technology Learning Challenges

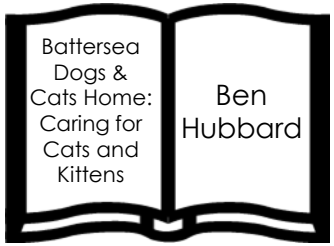
# Year 6

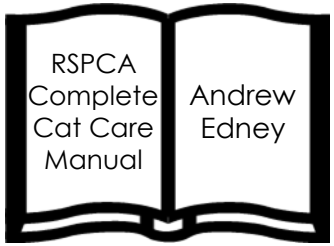
# Year 6: How can we help keep a cat fit and healthy?

| | |
|---|---|
| **Construction**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Visit a pet supplies shop and compare cat gym and scratching post products.** | |
| LC1 | What types of 'cat gym' and scratching posts are available from the shops and what materials do they use? |
| LC2 | What features should we include in our design and why are they suitable for the needs of a cat? |
| LC3 | What materials will we need and can we work within a budget? |
| LC4 | How will we cut and join the materials we are using? |
| LC5 | Can we produce alternative designs and justify our final choice? |
| LC6 | Can we construct a product that looks good and does the job? |
| Ref | Do 8 out of 10 cats prefer our products? |

**Literacy Link:** Opportunities for children to research about cats and their care.

**Mathematics Link:** Opportunities for children to measure and calculate with money.




The Learning Challenge CURRICULUM

# How can we help keep a cat fit and healthy?

## Year 6

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
|---|---|---|
| • Can they use a range of information to inform their design?<br>• Can they use market research to inform plans?<br>• Can they work within constraints?<br>• Can they follow and refine their plan if necessary?<br>• Can they justify their plan to someone else?<br>• Do they consider culture and society in their designs? | • Can they use tools and materials precisely?<br>• Do they change the way they are working if needed? | • How well do they test and evaluate their final product?<br>• Is it fit for purpose?<br>• What would improve it?<br>• Would different resources have improved their product?<br>• Would they need more or different information to make it even better? |

**Breadth of study**

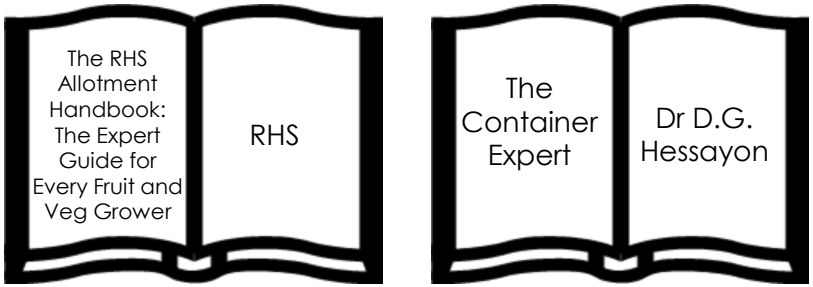
- Did they consider the use of the product when selecting materials?
- Does their product meet all design criteria?
- Have they thought about how their product could be sold?
- Have they given considered thought about what would improve their product even more?
- Can they justify why they selected specific 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?

# Year 6: Where can we grow our strawberry plants?

| | |
|---|---|
| **Mouldable Materials**<br>**When designing and making, pupils should be taught to: Select from and use a wider range of materials according to their functional properties and aesthetic qualities.** | |
| WOW: **Visit a pick your own strawberry farm or have a strawberry picnic.** | |
| LC1 | What do strawberries need to grow well? |
| LC2 | What kind of clay container is best for strawberry plants and what features must we include in our designs? |
| LC3 | How will we evaluate our plans and decide which product to make? |
| LC4 | How will we shape our container? |
| LC5 | How will we make sure our container looks good as well as working well? |
| Ref | Did our strawberries thrive in our pots and how could they be improved? |

**Literacy Link:** Opportunities for the children to research and record their findings.

**Science Link:** Opportunities for the children to revisit conditions for plant growth and the life cycle of plants.




The Learning Challenge CURRICULUM

# Where can we grow our strawberry plants?

## Year 6

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

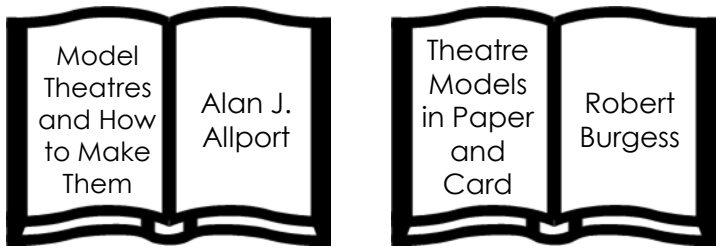
**Mouldable materials**
- Did they consider the use of the product when selecting materials?
- Does their product meet all design criteria?

# Year 6: Will our model theatre be ready for opening night?

| | |
|---|---|
| **<u>Mechanisms: Electrical and Mechanical Components</u>**<br>**When designing and making, pupils should be taught to:**<br>**Select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Examine a real model theatre or watch film clips.** | |
| LC1 | How will we construct the framework for our model theatre? |
| LC2 | What materials and cutting and joining techniques will we use to add the detail? |
| LC3 | How will we move and control the figures on the stage? |
| LC4 | How can we incorporate lights and how will they be controlled? |
| LC5 | Can we add any other electrically controlled features such as opening and closing curtains? |
| LC6 | Can we incorporate any other moving features using mechanisms? |
| LC7 | Can we perform a show using our theatre? |
| Ref | Can we produce a step-by-step guide to making a working model theatre? |

**Science Link:** Opportunities for children to apply what they have learned about electricity and circuits during Key Stage 2.

**Literacy Link:** Children can produce this as a book for a wider audience.




The Learning Challenge CURRICULUM

# Will our model theatre be ready for opening night?

## Year 6

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Electrical and mechanical components**
- Can they use different kinds of circuit in their product?
- Can they think of ways in which adding a circuit would improve their product?

# Year 6: Can we design and make a soft toy for a younger family member?

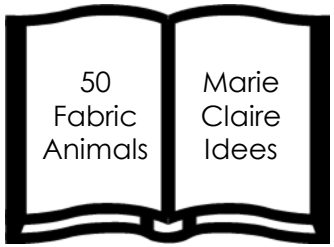
**(Many children may instead want to make this as a mascot or memento to take with them as they leave Y6. In any case it should obviously not be given to babies or very young children.)**

| | |
|---|---|
| **Textiles**<br>**When designing and making, pupils should be taught to: select from and use a wider range of materials and components, including textiles.** | |
| WOW**: Watch a clip of soft toy design and production in a factory.** | |
| LC1 | Which soft toys are most popular with younger children? |
| LC2 | What are the safety aspects of designing toys for younger children? |
| LC3 | Which textiles and other materials will we use and why? |
| LC4 | How will we develop our plans and templates? |
| LC5 | Which joining techniques will we use? |
| LC6 | Is our product finished to a high standard and how could it be improved? |
| Ref | How would we market our toy if it was manufactured commercially? |

**Literacy Links:** Opportunities for the children to research and report their findings

**Mathematics Links:** The children can measure accurately, calculate the cost of fabric and work to scale.

**Literacy Link:** Opportunities for the children to write reports.


The Learning Challenge CURRICULUM

# Can we design and make a soft toy for a younger family member?

## Year 6

| Developing, planning and communicating ideas | Working with tools, equipment, materials and components to make quality products | Evaluating processes and products |
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**Breadth of study**

**Textiles**
- Have they thought about how their product could be sold?
- Have they given considered thought about what would improve their product even more?

# Year 6: Can we grow our own salad?

**Cooking and Nutrition**
**Pupils should be taught to:**
**Understand and apply the principles of a healthy and varied diet**
**Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques**
**Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.**

WOW: **Visit an arable farm, smallholding or allotment.**

| | |
|---|---|
| LC1 | What is in a shop-bought salad and where did the ingredients come from? |
| LC2 | Which salad crops can we grow at school and what do we need to do to help them grow? |
| LC3 | When should we plant the seeds so the crops ripen at the same time? |
| LC4 | What do we want in our individual or group salad and why? |
| LC5 | How will we prepare our salad, ensuring it looks appetising? |
| LC6 | What will we serve with our salads? |
| LC7 | How do we prepare the growing area to make it ready for next year's crop? |
| Ref | What advice would we give Year 5 when they grow salad crops next year? |

**Geography Link:** Children can use maps and find transport routes.

**Literacy Links:** Opportunities for the children to research and use gardening books and websites.

**Oracy Link:** Opportunities for the children to discuss, compare, explain and justify their reasons.

**Literacy Link:** Opportunities for children to write about their experiences.

The Learning Challenge CURRICULUM

# Can we grow our own salad?

## Year 6

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**Breadth of study**

**Cooking and nutrition**

- Can they explain how their product should be stored with reasons?
- Can they set out to grow their own products with a view to making a salad, taking account of time required to grow different foods?

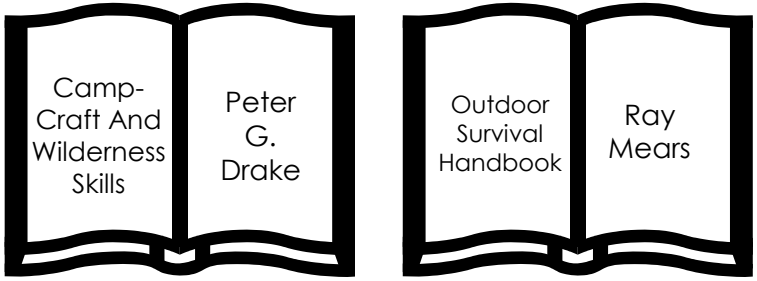
# Year 6: How can we shelter from the storm?

**Materials**
**When designing and making, pupils should be taught to: Select from and use a wider range of materials and components, including construction materials and textiles, according to their functional properties and aesthetic qualities.**

| | |
|---|---|
| WOW: **Watch a clip on shelter making from a survival programme.** | |
| LC1 | What makes a good emergency shelter? |
| LC2 | Which textiles would be best for shelter building? |
| LC3 | How will we join wood, textiles and other materials so the joins are storm-proof? |
| LC4 | If we have a limited 'budget' what materials will we 'buy' to make our shelter? |
| LC5 | Can we plan our designs first before construction? |
| LC5 | Does our shelter look good enough to be photographed for a survival guide? |
| LC6 | How can we improve our design? |
| Ref | Did our shelter work - was it rain, sun and wind proof? |

**Geography Link:** Opportunities for the children to learn about natural disasters around the world, linked to location and climate.

**Mathematics Links:** Opportunities for the children to calculate, including using money, measurements and area.




The Learning Challenge CURRICULUM

# How can we shelter from the storm?

## Year 6

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**Breadth of study**

**Stiff and flexible sheet materials**

- 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?