
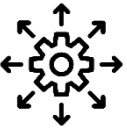
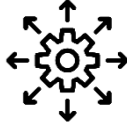






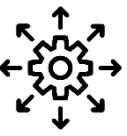

# Blue Gate Fields Junior School Design and Technology

A progression of skills, knowledge and habits of mind

		What does it involve?	Lower Key Stage 2	Upper Key Stage 2	Design thinking and engineering habits of mind
<b>Designing</b>	Ask	<p><b>Understanding contexts, user and purposes</b></p> <ul style="list-style-type: none"> <li>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.</li> <li>Define a simple problem with multiple criteria for success and multiple constraints.</li> <li>Investigate and analyse a range of existing products.</li> </ul>	<p><b>Across Key Stage 2 pupils will:</b></p> <ul style="list-style-type: none"> <li>Work confidently within a range of contexts, such as the home, school, leisure, culture, enterprise, industry and the wider environment</li> <li>Describe the purpose of their products</li> <li>Indicate the design features of their products that will appeal to intended users</li> <li>Explain how particular parts of their products work</li> </ul>		<p><b>Problem finding</b> Ask pertinent questions to better understand design problems, success criteria and constraints </p> <p><b>System thinking</b> Identify a product's systems and components and how they interact </p>
	Imagine and plan	<p><b>Generating, developing, modelling and communicating ideas</b></p> <ul style="list-style-type: none"> <li>Generate, develop, model and communicate ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.</li> </ul>	<p><b>Across Key Stage 2 pupils will:</b></p> <ul style="list-style-type: none"> <li>Share and clarify ideas through discussion</li> <li>Model their ideas using prototypes and pattern pieces</li> <li>Use annotated sketches, cross sectional drawings and exploded diagrams to develop and communicate their ideas</li> <li>Use computer aided design to develop and communicate their ideas</li> </ul>	<p><b>In lower Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>Gather information about the needs and wants of particular individuals and groups</li> <li>Develop their own design criteria and use these to inform their ideas</li> </ul>	<p><b>In upper Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>Carry out research, using surveys, interviews, questionnaires and web-based resources</li> <li>Identify the needs, wants, preferences and values of particular individuals and groups</li> <li>Develop a simple design specification to guide their thinking</li> </ul>

<b>Technical Knowledge</b>		<b>Making products work</b>	<p><b>Across Key Stage 2 pupils will know:</b></p> <ul style="list-style-type: none"> <li>• How to use science to help design and make products work</li> <li>• How to use learning from mathematics to help design and make products that work</li> <li>• That materials have both functional and aesthetic properties and qualities</li> <li>• That materials can be combined and mixed to create more useful characteristics</li> <li>• That mechanical and electrical systems have an input, process and output</li> <li>• The correct technical vocabulary for the projects they are undertaking</li> </ul>		
			<p><b>In lower Key Stage 2 pupils should also know:</b></p> <ul style="list-style-type: none"> <li>• How mechanical systems such as levers and linkages or pneumatic systems create movement</li> <li>• How simple electrical circuits and components can be used to create functional products</li> <li>• How to program a computer to control their products</li> <li>• How to make stiff, strong shell structures</li> <li>• That a single fabric shape can be used to make a 3D textiles product</li> <li>• That food ingredients can be fresh, pre-cooked and processed</li> </ul>	<p><b>In upper Key Stage 2 pupils should also know:</b></p> <ul style="list-style-type: none"> <li>• How mechanical systems such as cams and or pulleys or gears create movement</li> <li>• How more complex electrical circuits and components can be used to create functional products</li> <li>• How to program a computer to monitor changes in the environment and control their products</li> <li>• How to reinforce and strengthen a 3D framework</li> <li>• That a 3D textiles product can be made from a combination of fabric shapes</li> <li>• That a recipe can be adapted by adding or substituting one or more ingredients</li> </ul>	
<b>Making</b>	Create	<b>Planning</b>	<p><b>Across Key Stage 2 pupils will:</b></p> <ul style="list-style-type: none"> <li>• Select tools and equipment suitable for the task</li> <li>• Explain their choices of tools and equipment in relation to the skills and techniques they will be using</li> <li>• Select materials and components suitable for the task</li> <li>• Explain their choice of materials and components according to functional properties and aesthetic qualities</li> </ul>		<p><b>System thinking</b> Constructs an object requiring successful interaction between components</p> 
			<p><b>In lower Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Order the main Stages of making</li> </ul>	<p><b>In upper Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Produce appropriate lists of tools, equipment and materials they need</li> <li>• Formulate step-by-step plans as a guide to material</li> </ul>	
		<b>Practical skills and techniques</b>	<p><b>Across Key Stage 2 pupils will:</b></p> <ul style="list-style-type: none"> <li>• Follow procedures for safety and hygiene</li> <li>• Use a wider range of materials and components than KS1, including construction materials and kits, textiles, food ingredients, mechanical components and electrical components</li> </ul>		<p><b>Adapting</b> Embrace the ability to flit between plans to adapt to any problems that arise</p> 

			<p><b>In lower Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Measure, mark out, cut and shape materials and components with some accuracy</li> <li>• Assemble, join and combine materials with some accuracy</li> <li>• Apply a range of finishing techniques, including those from art and design, with some accuracy</li> </ul>	<p><b>In upper Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Accurately measure, mark out, cut and shape materials and components</li> <li>• Accurately assemble, join and combine materials</li> <li>• Accurately apply a range of finishing techniques, including those from art and design</li> <li>• Use techniques that involve a number of steps</li> <li>• Demonstrate resourcefulness when tackling practical problems</li> </ul>	<p><b>Creative problem solving</b> Generate multiple ideas 'on the fly' when working hands-on and evaluates and communicates various merits/drawbacks of these.</p> 
<b>Evaluating</b>	<b>Improve</b>	<p><b>Own ideas and products</b></p> <ul style="list-style-type: none"> <li>• Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work</li> <li>• Judge the success of a design solution using a specifies testing procedure</li> <li>• Identify points of failure</li> </ul>	<p><b>Across Key Stage 2 pupils will:</b></p> <ul style="list-style-type: none"> <li>• Identify the strengths and areas for development in their products and ideas</li> <li>• Consider the views of others, including intended users, to improve their work</li> </ul>		<p><b>Improving</b> Makes objective judgements against success criteria and constraints. Explores specific points of failure for ways to improve whilst acknowledging possible trade-off within constraints.</p> 
			<p><b>In lower Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Refer to their design criteria as they design and make</li> <li>• Use their design criteria to evaluate their completed products</li> </ul>	<p><b>In upper Key Stage 2 pupils should also:</b></p> <ul style="list-style-type: none"> <li>• Critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make</li> <li>• Evaluate their ideas and products against their original design specification</li> </ul>	
		<p><b>Existing products</b></p>	<p><b>Across Key Stage 2 pupils will investigate and analyse:</b></p> <ul style="list-style-type: none"> <li>• How well products have been designed and made</li> <li>• Why materials have been chosen</li> <li>• What methods of construction have been used</li> <li>• How well products work</li> <li>• How well products achieve their purposes</li> <li>• How well products meet user needs and wants</li> </ul>		
			<p><b>In lower Key Stage 2 pupils should also investigate and analyse:</b></p> <ul style="list-style-type: none"> <li>• Who designed and made the products</li> <li>• Where products were designed and made</li> <li>• When products were designed and made</li> <li>• Whether products can be recycled or reused</li> </ul>	<p><b>In upper Key Stage 2 pupils should also investigate and analyse:</b></p> <ul style="list-style-type: none"> <li>• How much products cost to make</li> <li>• How innovative products are</li> <li>• How sustainable the materials in their products are</li> <li>• What impact products have beyond their intended purpose</li> </ul>	
	<p><b>Key events and individuals</b></p>	<p><b>Across Key Stage 2 pupils should know:</b></p> <ul style="list-style-type: none"> <li>• About inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products</li> </ul>			

<b>Food Technology</b>	Cooking and nutrition provides opportunities for pupils to learn about where food comes from, how food is grown, reared or caught and the effect of seasonality on the availability of food. They learn about the principles of healthy eating and how to prepare and cook dishes safely and hygienically using a range of techniques. Cooking and nutrition is taught alongside designing and making within a D&T food project.	<b>Across Key Stage 2 pupils will know:</b>		<b>Problem finding</b> Ask pertinent questions to better understand design problems, success criteria and constraints   <b>System thinking</b> Identify a product's systems and components and how they interact   <b>Adapting</b> Critically evaluates links with existing ideas, modifies/transforms ideas to benefit new context. 
		<b>In lower Key Stage 2 pupils should know:</b> <ul style="list-style-type: none"> <li>That a healthy diet is made up from a variety and balance of different food and drink, as depicted in The Eatwell Guide</li> <li>That to be active and healthy, food and drink are needed to provide energy for the body</li> </ul>	<b>In upper Key Stage 2 pupils should also know:</b> <ul style="list-style-type: none"> <li>That seasons may affect the food available</li> <li>How food is processed into ingredients that can be eaten or used in cooking</li> <li>That recipes can be adapted to change the appearance, taste, texture and aroma</li> <li>That different food and drink contain different substances – nutrients, water and fibre – that are needed for health</li> </ul>	

## Principles for Design and Technology

### 1 problem solving



Pupils are engaged in purposeful, reflective practical problem solving

### 2 taking ownership



Pupils take collaborative ownership of the design and make process including taking ethical consideration

### 3 embracing failure



Pupils embrace and learn from failure – they are resilient

### 4 curiosity and creativity



Pupils are curious and creative; they have open minds

### 5 mastery



Pupils demonstrate mastery from other curriculum areas - they are resourceful

### 6 personal capabilities



Pupils draw on a range of thinking skills and personal capabilities

#### With reference to:

Department for Education Design and technology programmes of study: key Stages 1 and 2 September 2013

The Design and Technology Association

Lucas' 2014 report 'Thinking like an engineer'.

The Royal Academy of Engineering